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The nature of depression in Chinese populations within and outside of pregnancy: A study in Inner Mongolia

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Declaration

I declare that this thesis has been written by me. This work has not been submitted for any other degree or professional qualifications.

Ho Nam Cheung

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Thesis Abstract

Depression poses a global threat for mental health (Murray & Lopez, 1996). However, in China, national studies of depression epidemiology are very few. Only from 2011 have Chinese researchers began to adopt internationally recognized diagnostic criteria and standardized interview instruments in psychiatric epidemiological surveys (Guo et al., 2011), and previous studies generated inconsistent results of depressive prevalence. As the largest ethnic group in the world, the Chinese account for 18.9% of the world's population (National Bureau of Statistics of China, 2015). Yet most research on depression is based on Western samples and may not accurately characterize depression as experienced by Chinese populations. This thesis examines depression in non-pregnant and pregnant women in Inner Mongolia, who are under the influence of cultural values of collectivism and social factors specific to China. Chinese society adheres firmly to traditional values (Whyte, 2005), while market reform, birth-control policy, together with high parental investment in childcare and rearing construct a unique and sometimes unfavorable environment for Chinese women that may influence their depression expression.

This thesis includes a series of three linked studies. The first study validated the 52-item New Multidimensional Depression Scale (MDAS) with clinically depressed individuals in Inner Mongolia. The aims were to assess whether the MDAS demonstrated good psychometric properties in clinically depressed Chinese patients for the scale to be factor analysed on a Chinese construct of depression symptomatology to show cultural characteristics in China. This aim was achieved by carrying out Exploratory and Confirmatory factor analysis in separate studies. One hundred and seventy-one clinically depressed participants were recruited in Inner Mongolia. They were given the MDAS and Beck Depressive Inventory (BDI) and other scales to complete. The psychometric properties of the MDAS were tested regarding reliability and validity. Following which an Exploratory factor analysis (EFA) was run on MDAS. Several findings emerged in the study. First, the first factor extracted comprised of core psychological and affective symptoms conceptualized in

the Western construct of depression. An interpersonal-cognitive factor was extracted as the second factor, followed by a third somatic factor in the cluster of symptoms. The results suggested that core affective and cognitive symptoms for diagnosis are universal across cultures, while Chinese individuals express interpersonal symptoms that characterized their collectivistic culture that emphasizes interpersonal harmony.

Study 2 examined depressive symptoms in the antenatal period in Inner Mongolia women. Two-hundred and thirty-four women, mostly in their third trimester, were recruited in an antenatal hospital in Inner Mongolia. They completed the MDAS, Beck Depression Inventory (BDI) and Edinburgh Postpartum Depression Scale (EPDS). In exploring how depression in its item content is expressed and experienced by pregnant Chinese women, the study also searched for the best-fit model of MDAS on pregnant women in Inner Mongolia. It compared three factor models: the three-factor structure of MDAS from study 1, the hypothesized four-factor model corresponding to each subscale (emotional, cognitive, somatic and interpersonal), and the one-factor model corresponding to a unidimensional structure of the MDAS. A best-fit model was found for the four-factor model, supporting using the four hypothesized subscales of MDAS on pregnant women. In a subsequent step, the MDAS was validated and its psychometric properties were tested to show illustrated results. The findings supported measuring interpersonal symptoms in self-report measurements to measure different aspects of depressive severity in Chinese pregnant women. In particular, somatic symptoms should be considered with caution in screening and primary care. The finding has significant implications for assessing with self-report questionnaires, which are widely used in clinical settings.

Study 3 was based on the same sample as study 2 and investigated risk factors associated with antenatal depression in China. China has undergone drastic socio-economic and political transformation in the last twenty years. Unfortunately, market reform is creating less favourable employment conditions, and the traditional value of male dominance still stands firmly in the society. Women are facing more financial

insecurity and a tight birth control policy and growing stress in work-and-family balance. All these create an environment that could contribute to their depression that could be expressed in a different way from Western populations. Depression may also be underlined by different risk factors related to the social and cultural environment. This study measured demographic characteristics (including age, education, employment, week of gestation, first pregnancy), social support, social activity, work stress, and work-family balance and their relationship with depression. It included three parts. In part 1 participants were classified into depressed and non-depressed groups using EPDS>10 as the cut-off point for depression. The two groups were compared on demographic variables using the Chi-square test and on psychosocial risk factors using the Mann-Whitney U test. No significant demographic variable was found to distinguish the two groups, whereas self-esteem, work stress and social activities differed significant between depressed and non-depressed pregnant women. Bivariate correlations between psychosocial risk factors and depressive scales (MDAS, BDI and EPDS) gave rise to significant correlations between risk factors and each scale. In the third part hierarchical multiple linear regression analysis examined associations between social and demographic risk factors and depression. The results showed that work stress, work-and-family balance, social activity and social support were significantly associated with depressive severity in overall severity of depression (total MDAS score) and each domain of depressive severity (each subscale of MDAS).

In conclusion, the three studies together provide novel insight into our understanding of depression within and outside of pregnancy in Chinese women, in terms of symptoms and risk factors. The Western conceptualization of depression possesses great validity across cultures, that the core symptoms of depression remain universal for diagnosis. Chinese cultural values and social environment are reflected in the cultural expressions of depressive symptoms especially in depressed individuals but less affective in pregnant women. As hypothesized, Chinese society influenced risk factors related to education and work-family balance in pregnant women. The result supported using a scale with a comprehensive interpersonal symptom checklist because it potentially captures Chinese expression and experience, which could be

characterized by an interpersonal style of illness presentation. In addition, the best-fit four-factor model supported including interpersonal symptoms in self-report measures and they are also related to different risk factors from other domains of depressive symptoms. This could be linked to some unfavourable social and cultural influence pregnant Chinese women experience. The thesis gives rise to implications for potential clinical applications. The advancement of cultural characteristics in symptom contents in both clinical and pregnant population facilitates a better symptom checklist for assessing depression severity. In particular, it helps to modify existing self-report questionnaires with culturally sensitive symptoms for better discrimination of individuals.

Thesis Lay summary

Depression poses a global threat for mental health (Murray & Lopez, 1996). However, in China, national studies of depression epidemiology are very few. Only from 2011 have Chinese researchers began to adopt internationally recognized diagnostic criteria and standardized interview instruments in psychiatric epidemiological surveys (Guo et al., 2011), and previous studies generated inconsistent results of depressive prevalence. As the largest ethnic group in the world, the Chinese account for 18.9% of the world's population (National Bureau of Statistics of China, 2015). Yet most research on depression is based on Western samples and may not accurately characterize depression as experienced by Chinese populations. This thesis examines depression in non-pregnant and pregnant women in Inner Mongolia, who are under the influence of cultural values of collectivism and social factors specific to China. Chinese society adheres firmly to traditional values (Whyte, 2005), while market reform, birth-control policy, together with high parental investment in childcare and rearing construct a unique and sometimes unfavorable environment for Chinese women that may influence their depression expression.

This thesis includes a series of three linked studies and together they gave rise to a picture of symptom factor structure in the Chinese context within and outside of pregnancy and the associated risk factors and explored the clinical usage of a multidimensional depression assessment scale (Chinese-MDAS). Clinically depressed Chinese patients experienced core affective and cognitive symptoms, which are universal diagnosis criteria. At the same time, they also experienced interpersonal symptoms that characterized their collectivistic culture that emphasizes interpersonal harmony. Subsequent studies provided support for assessing depressive symptoms using a multi-dimensional depression scale with the inclusion of interpersonal scale. Pregnant women in Inner Mongolia demonstrated a more closely coherent factor structure of depressive symptoms than population in Western societies. However, the study provided support for the inclusion of interpersonal symptoms in measuring depression severity and its separate use in depression assessment on Chinese pregnant

population. In particular, somatic symptoms should be considered with caution in screening and primary care. Given the drastic socio-economic and political transformation China has undergone in twenty years, unfortunately, market reform is creating a less favourable employment condition, and the traditional value of male dominance still stands firmly in the society. Women are facing more financial insecurity and a tight birth control policy and growing stress in work-and-family balance. All these create an environment that could contribute to their depression. Depression may also be underlined by different risk factors related to the social and cultural environment. This study also demonstrated supporting evidence that self-esteem, work stress, work-and-family balance, social activity and social support are significantly associated with depressive severity in various aspects of symptoms.

In conclusion, the three studies together provide novel insight into our understanding of depression within and outside of pregnancy in Chinese women, in terms of symptom content and risk factors. Chinese cultural values and social environment are reflected in the cultural expressions and risk factors of depressive symptoms. While the Western conceptualization of depression possesses great validity across cultures, that the core symptoms of depression remain universal for diagnosis, the study added to the body of knowledge that variation in factor structure in different cultures could highlight characteristics and subtle variations in the conceptualization and expression of depression. A scale with a comprehensive interpersonal symptom checklist is necessary for measuring depressive severity in Chinese population, especially in pregnant women. This could be linked to some unfavourable social and cultural influence they experience. The thesis gives rise to implications for potential clinical applications. The advancement of cultural characteristics in symptom contents in both clinical and pregnant population in China facilitates a better symptom checklist for assessing depression severity. In particular, it helps to modify existing self-report questionnaires with culturally sensitive symptoms for better discrimination of individuals.

Table of Contents

List of Tables

List of Figures

List of Abbreviations

MDD	Major Depressive Disorder
DSM-5	Diagnostic and Statistical Manual-Fifth Edition
EPDS	Edinburgh Postnatal Depression Scale
CES-D	Centre for Epidemiological Studies Depression Scale
GHQ	General Health Questionnaire
HADS	Hospital Anxiety and Depression Scale-Depression Subscale (HADS-D)
K-10	The Kessler Psychological Distress Scale
PDS	The Pregnancy Depression Scale
PDSS	The Postpartum Depression Screening Scale
PHQ	Patient Health Questionnaire
Zung-SDS	Zung Self-Rating Depression Scale
AKUADS	The Aga Khan University Anxiety and Depression Scale
IDS-SR	The Inventory of Depressive Symptomatology, self-report version
BDI	Beck Depression Inventory
MDAS	the Multidimensional Depression Assessment Scale
SDS	Sheehan's Disability Scale
SES	Rosenberg Self-Esteem Scale
WSS	Work Stress Survey
WFC	Work-Family Conflict (WFC) and (FWC)
FWC	Family-Work Conflict Scale
SFS subscale	Sub-scale of Social Functioning Scale (SFS subscale)
SOS	The Significant Others Scale Short Version
EFA	Exploratory Factor Analysis

CFA	Confirmatory Factor Analysis

CHAPTER ONE

AN INTRODUCTION TO MAJOR DEPRESSION IN CHINA

1.1 Introduction

This thesis centers on exploring depressive symptoms in Chinese clinically depressed people and pregnant women in Inner Mongolia using a newly developed scale: The Multidimensional Depression Assessment Scale (MDAS) which captures four domains of depressive symptoms: emotional, cognitive, somatic, and interpersonal. Inner Mongolia represents a typical collectivist society and is relatively under-researched. The majority of studies on Chinese populations focus more on the southern part of China, where Western individualism has greater influence on the cognition and perception of the self and mental health. This thesis aims to highlight the manifestation and presentation of depressive symptoms in a highly collectivistic culture, and explore how culture shapes the experience of depressive symptoms during pregnancy. It also investigates the risk factors for depression in Chinese pregnant women in this specific social, cultural and political context.

The literature review chapters take a comprehensive narrative approach to reviewing existing literature on major depression, ante- and post-natal depression, and cultural factors in China that may influence depression aetiology, incidence and symptomology. Psychological research was sourced using a range key search terms across a variety of bibliographic data-bases (see page 56 for more detail). However, a range of other sources of literature have also been used, including policy documents, and social science research on Chinese culture (such as the One Child Policy and gender expectations and roles). These different sources of literature have been narratively synthesized to provide coherent overview of existing research, and a strong rationale for the empirical studies presented in this thesis

Chapter 1 provides a brief introduction to the general characteristics of depression. It also sets the stage for the subsequent discussion of depressive symptoms in Chinese pregnant women by introducing the social, political and economic changes in modern China, including its unique one-child policy. It portrays the important role of interpersonal stress in Chinese society and draws a general picture of the expression of depression in China under cultural and social influences.

Chapter 2 discusses current research into antenatal depression in both China and Western societies, including its diagnosis, symptoms, etiology, epidemiology and its outcome. In terms of previous studies on depressive symptoms in Western and Chinese populations, studies are reviewed on symptom profiles during pregnancy. The chapter provides a comprehensive description of the historical and cultural characteristics of China, which may create a different pregnancy experience for Chinese women compared to those in Western societies.

Chapter 3 reviews common self-reported measures of depressive symptoms that have been validated and used with pregnant populations. It considers their psychometric properties and provides critiques of their potential strength and weaknesses when used to assess depressive symptoms during pregnancy in Chinese women.

Following the literature review chapters, the empirical chapters 4, 5, and 6 present three connected studies. Chapters 4 and 5 present the validation of the MDAS on clinically depressed populations and pregnant women in Inner Mongolia respectively. Chapter 5 compared the factor structure of three models, the three-factor model obtained from EFA in study 1, the four-factor model corresponding to each subscale of the MDAS hypothesized during the development of the MDAS, and the single-factor structure that postulates the MDAS as a unidimensional model. Chapter 6 presents a study that looked into risk factors associated with depression in Chinese pregnant women and investigated their associations with depression using a bivariate analysis and a hierarchical multiple linear regression model.

In Chapter 4 the 52-item Multidimensional Depression Scale (MDAS) was validated on clinically depressed individuals in Inner Mongolia. This study intended to address two research questions: Does the Chinese version of MDAS (Chinese- MDAS) demonstrate good psychometric properties for clinically depressed Chinese patients in Inner Mongolia? Alternatively, do Chinese clinically depressed patients show a unique pattern of depressive symptomatology that is consistent with the cultural characteristics of China as reviewed in chapter one?

In Chapter 5 the psychometric properties of the MDAS was examined in a sample of pregnant women in Inner Mongolia. Three factor models were compared in this study. They included a three-factor model obtained in chapter 4, a hypothesized four-factor structure of the MDAS at its development, and a single-factor structure incorporating all items in the MDAS. A data-driven approach such as EFA in chapter 4 allowed the harvest of a factor structure on a collectivistic population that has never been studied previously and the possible emergence of cultural characteristics of depression. As interpersonal harmony and role fulfilment are important in Chinese culture, especially for women, interpersonal symptoms of depression could be particularly salient indicators for assessing depression severity in this population. In searching for the best-fit factor model of the MDAS, it facilitated future research and clinical usage of MDAS on pregnant women in China. This chapter aims to answer two questions: What is the best factor structure of MDAS that fitted pregnant women in Inner Mongolia? What are the psychometric characteristics of Chinese- MDAS in pregnant women in Inner Mongolia? In particular, could the results provide more information on the debate of removing all somatic symptoms from the screening of antenatal depression? Could any of them be possibly used in the screening of antenatal depression?

Chapter 6 examines the risk factors for antenatal depression in China using risk factors that were previously identified in Western and Chinese literature and theoretically probable risk factors for depression in China under the unique working and living conditions for Inner Mongolia women. Demographic characteristics that have been shown in the literature to be associated with antenatal depression are investigated,

including age, education, employment, week of gestation, and first pregnancy. On top of that, this chapter addresses whether social support, social activity, work stress, and its interference with family life contribute to higher risk in antenatal depression in Chinese women. This provides insight into the factors associated with antenatal depression in Chinese women from a more collectivist background. It also provides more information on depression during pregnancy in Inner Mongolia, the work stress, family and social lives of pregnant women and why some factors could contribute to their mental disorder.

Finally, in chapter 7 the findings are synthesized with the current literature, following which is a critical reflection of the thesis, together with the implications and directions for future studies.

1.2 An overview on Major Depressive Disorder (MDD)

The following sections (1.2.1 and 1.2.2) introduce the general characteristics of Major Depressive Disorder including its prevalence and diagnosis.

1.2.1 Features of Major Depressive Disorder

The World Health Organization (WHO) has identified Major Depressive Disorder (MDD) as a serious and growing threat to global wellbeing. Depression is currently the fourth leading cause of illness-related disability. It is estimated to become the second leading cause of illness-related disability by 2020 (World Health Organization (WHO), 2011). Depression has been associated with suicide and non-fatal suicidal behaviour (Campos & Holden, 2015; Hawton, Casañas i Comabella, Haw, & Saunders, 2013), life-threatening medical conditions such as coronary heart disease (Goldston & Baillie, 2008) and diabetes (Knol et al., 2006), psychosis (Rössler et al., 2011) and co-morbid psychiatric conditions (Kessler et al., 2005).

MDD is a highly prevalent disorder (Friedman, 2014). In primary care settings, depression is one of the most commonly found mental disorders, detected in 5–10% of adult patients (Pignone et al., 2002). A particularly high prevalence was found in the USA (16.2% for lifetime and 6.6% for the 12 months before the survey) (Kessler et al., 2003). A meta-analysis conducted by Waraich, Goldner, Somers, and Hsu (2004) reported a lifetime prevalence of 6.7% and 12-month prevalence of 4.1% from 23 studies including various countries across Europe, Asia, North and South America, and Australia. Depression is highly recurrent (Burcusa & Iacono, 2007). At least 50% of people with a first episode of depression will experience one or more additional episodes in their lifetime. Around 80% of MDD patients who have experienced two episodes will have another recurrence (American Psychiatric Association, 2000; Kupfer, Frank, & Wamhoff, 1996). Recurrent episodes usually begin within five years after the onset of the initial episode (Lewinsohn, Clarke, Seeley, & Rohde, 1994).

1.2.2 Symptoms and Diagnostic criteria of MDD

MDD is heterogeneous in that its phenotypic expression varies between individuals (signs, symptoms, and severity of specific indicators), and aetiology shows individual variation (Monroe & Anderson, 2015). It is characterized by psychological, cognitive and somatic symptoms as core symptoms (American Psychiatric Association, 2013; Friedman, 2014). The description of depression has remained unchanged from earlier versions of the Diagnostic and Statistical Manual-Third Edition (DSM-III) (American Psychiatric Association, 1968) to the latest fifth version (DSM-V) (American Psychiatric Association, 2013). As described in the *Diagnostic and Statistical Manual of Mental Disorders*, fifth edition (DSM-V), individuals need to meet 5 out of 9 criteria of symptoms to be diagnosed as MDD. These include: (1) depressed mood, (2) markedly reduced interest or pleasure, (3) increase or decrease in either weight or appetite, (4) insomnia or hypersomnia, (5) psychomotor agitation or retardation, (6) fatigue or loss of energy, (7) feelings of worthlessness or inappropriate guilt, (8) lowered ability to think or concentrate, or indecisiveness, and (9) recurrent thoughts of death or recurrent suicidal ideation (APA, 2013). At least symptom (1) and/or (2)

have to present. Among the 9 criteria, 4 are compound symptoms, including different sub-symptoms (feelings of worthlessness or inappropriate guilt) or opposite sub-symptoms (insomnia or hypersomnia, psychomotor agitation or retardation, weight loss or weight gain).

MDD is also heterogeneous in terms of depressive symptoms (Baumeister & Parker, 2012; Lichtenberg & Belmaker, 2010). Following the diagnostic instruction and criteria given by DSM-IV, Østergaard, Jensen, and Bech (2011) generated 1,497 combinations of symptom profiles that meet the diagnostic criteria of the DSM-IV, without taking into consideration the psychotic subtype of depression (delusions and/or hallucinations), and unipolar and bipolar courses of illness. The study also reported that some diagnosed patients do not share one single symptom even if they are put into one undifferentiated category of disorder (Fried, 2014). If the course, severity and aetiological explanations are taken into consideration (Luyten, Blatt, Van Houdenhove, & Corveleyn, 2006; Parker, 2005), the clinical presentation of MDD will be even more heterogeneous than the estimation made by Ostergaard et al. (2011) (Keller, Neale, & Kendler, 2007). Symptom profiles could also change between individuals and within individuals across time (Oquendo et al., 2004).

While DSM has been developed by the professional body of psychiatrists in the United States to classify and diagnose mental disorders, another classification system, the *International Classification of Diseases*, 10th revision (ICD-10) was published by the World Health Organization (1993) to be used internationally. It also specified sad mood, anhedonia, and reduced energy/fatigue as three typical symptoms of depression (World Health Organization (WHO), 1993), and listed other common symptoms of depression as concentration difficulties, guilt and feelings of worthlessness, a pessimistic view of the future, thoughts of self-harm or suicide, disturbed sleeping pattern, and a decrease in appetite. ICD-10 also mentioned a reduction in self-esteem and self-confidence, which was not covered in DSM-5. The two classification systems are likely to be functionally equivalent in clinical practice (Andrews, Slade, & Peters, 1999) and have high concordance for depressive episodes and dysthymia (Andrews et

al., 1999), though the ICD-10 has a lower threshold of symptom requirements (WHO, 1993).

1.3 MDD impairs functioning

Severe or very severe impairment in functioning is found in approximately 60% of individuals who meet the diagnostic criteria for MDD (Kessler et al., 2003). Extensive evidence shows that depression is associated with functional impairments which lead to dysfunctional psychosocial functioning, disrupted quality of life and various malfunctions at home, in the workplace and with friends and family (e.g. Greer et al., 2010; Hirschfeld et al., 2002; Lam et al., 2011; Miller et al., 1998), and disturbing their abilities for self-care and independent living (Fried, 2014).

A large-scale study by Wells and colleagues (1989) using the data from 11,242 depressed outpatients with or without chronic conditions linked depressive symptoms and depressive disorders with individuals' well-being and functioning in areas such as physical, social and role performance. Depressed patients in the study also perceived their health to be poorer and experienced greater bodily pain than did patients with no chronic conditions (Wells et al., 1989). Similarly, Herrman et al. (2002), in their LIDO (Longitudinal Investigation of Depression Outcomes) study across Israel, Brazil, Australia, Spain, Russian Federation and the US reported a link between higher depressive scores, lower quality of life and greater functional disability (N = 18,456).

In DSM-IV a marked transition was introduced into the diagnostic criteria: the criterion of "distress and impairment" (criterion C). The Diagnostic and Statistical Manual of Mental Disorders (The Fourth/Fifth Edition DSM-IV/DSM-V) codes functional impairment on Axis V in its multiaxial diagnostic system. It specifies that the depressive symptoms must "represent a change from previous functioning" and cause "clinically significant distress or impairment in social, occupational, or other important areas of functioning" (p. 161, APA, 2013). Similar criteria were also added for the diagnosis of other disorders. The functional impairment criterion draws a line

between normality and an abnormal state when the symptoms are not severe enough (Beals et al., 2004; Spitzer & Wakefield, 1999; Zimmerman, Chelminski, & Young, 2004). This criterion is useful as symptom scores or profiles may be less informative about the functioning change. In particular, a significantly positive association with impairments is found with the presence of less than five symptoms. In people with only one key depressive symptom, they were found to experience significantly worse functional impairments (Cuijpers, de Graaf, & van Dorsselaer, 2004). However, despite the awareness of the importance of assessing functioning impairment as the outcome of treatment, a meta-analysis of over 90 outcome measures of depression treatment indicated less than 5% of clinical trials in depression report functional outcomes (McKnight & Kashdan, 2009).

1.3.1 The role of interpersonal impairment in depression symptoms and assessment

Interpersonal impairments have an important relationship with depression. In empirical studies, for example, Barrett & Barber (2007) reported greater interpersonal distress in patients with major depressive disorder (MDD) than patients with other mental health problems. In particular, depressed patients encounter more problems with social isolation, avoidance of social situations, lack of assertiveness and emotional detachment. Renner et al. (2012) documented that the predominant interpersonal styles fall between social avoidance and non-assertiveness in patients with a major depressive disorder. Other symptoms, such as feeling worthlessness or guilt and their reassurance-seeking could create a negative social environment and social interaction, which maintain and prolong the current episode and may trigger future episodes which maintain the chronicity of depression (Hames, Hagan, & Joiner, 2013).

In particular, the importance of assessing social and interpersonal functioning serves as an indicator of recovery, in terms of reduction in symptoms and an improved interaction between the individual and the environment (Leader & Klein, 1996;

Weissman, Klerman, Paykel, Prusoff, & Hanson, 1974). The connection between impaired interpersonal functioning and depression is consistent and coherent across studies (Joiner & Coyne, 1999). However, the nature of the association remains in contention. By observing depressed individuals in experimental settings, researchers were able to study the impact of depression on basic behavioural features and communication. Patients in psychotherapy also often experience and report persistent difficulties in social relationships on top of their primary symptoms of the mental disorder itself (Horowitz, Rosenberg, Baer, Ureño, & Villaseñor, 1988).

While interpersonal deficits can be a consequence of depression, they have also been proposed to be stable characteristics predisposing vulnerable individuals to depression (Petty, Sachs-Ericsson, & Joiner, 2004). Indeed, Coyne (1976) as well as Joiner, Alfano, and Metalsky (1992) postulated in the interpersonal theory of depression that excessive reassurance-seeking and negative feedback-seeking contribute to the development and maintenance of depression. Mildly dysphoric individuals tend to seek reassurance from others to confirm that they are truly cared about, though they often question the sincerity of any reassurance. The behaviour is repeated with increasing frequency and intensity and eventually elicits rejection. The rejection and a perceived loss of social support could result in more severe depressive symptoms. The theory has received support in empirical studies. Excessive reassurance is significant predictor of depressive symptoms. It is also found to interact with low levels of social support to predict depressive symptoms (e.g. Haeffel et al., 2007). In addition, depressed individuals are also more likely to attend selectively to criticism and other negative interpersonal feedback from others, as is consistent with their negative self-concept (Swann, Wenzlaff, Krull, & Pelham, 1992). This behaviour has been identified as a potential vulnerability factor for depression when combined with negative life events (Pettit & Joiner, 2001; Rehman, Boucher, Duong, & George, 2008). It could also lead to peer rejection (Borelli & Prinstein, 2006) and consequently elevated depressive symptoms.

Depression is also found to be associated with broader interpersonal risk factors including interpersonal inhibition (avoidance, withdrawal, and shyness) (Alfano,

Thomas, & Perry, 1994; Joiner, 1997; Karevold, Roysamb, Ystrom, & Mathiesen, 2009; Murberg, 2009), interpersonal dependency (Blatt, Quinlan, Chevron, McDonald, & Zuroff, 1982; Mongrain, Lubbers, & Struthers, 2004; Shahar, Joiner, Zuroff, & Blatt, 2004), and insecure attachment style (Hankin, Kassel, & Abela, 2005; Roberts, Gotlib, & Kassel, 1996) in particular fearful attachment style (Conradi & de Jonge, 2009). However, social skills deficits as the risk factors for depression are not consistently found in studies which have strong methodological designs, such as longitudinal design and structured clinical interviews (Hames et al., 2013). Hence, further investigation is in need.

1.3.2 Interpersonal impairments in depression assessment

Unlike other symptoms, interpersonal symptoms are almost missing in self-report depression scales. DSM-V and all the commonly used self-report depression inventories, such as the Beck Depressive Inventory (BDI), Centre for Epidemiologic Studies Depression Scale (CES-D), and Hospital Anxiety and Depression Scale (Depression subscale) (HADS-D) only recognize social withdrawal as an important consequence for depression and a necessary criterion for distinguishing individuals with clinically significant disorder.

In research on depression, separate self-report inventories were often used to assess social functioning in depression outcome studies (Bech, 2005). Although many scales have been developed to measure various arrays of social functioning, they are far less used and cited when compared to depression symptomatic scales (McKnight & Kashdan, 2009). McKnight and Kashdan (2009) reviewed 14 most commonly used self-report scales for assessing social functioning. These scales measure various aspects of social functioning, such as: (1) General social functioning (the Short-Form Health Survey (SF-36) (Ware & Sherbourne, 1992), Social Adjustment Scale (SAS-II), (Schooler, Hogarty, & Weissman, 1979); The Social Functioning Questionnaire (SFQ) (Tyrer, 1990); Diagnostic Interview for Depression (DID) psychosocial

functioning subscale (Zimmerman, Sheeran, & Young, 2004); the Social Adjustment Scale (SAS-II) (Schooler et al., 1979); (2) Adjustment, satisfaction, and general relationship quality in social relationships: the Dyadic Adjustment Scale (DAS) (Spanier, 1976); (3) Interpersonal difficulties and distress (Inventory of Interpersonal Problems (IIP) (Horowitz et al., 1988); (4) Social relations and functioning in various contexts (The Social Adaptation Self-Evaluation Scale (SASS) (Paykel, 1999); The Social Adjustment Scale-Self Report (SAS-SR) (Weissman & Bothwell, 1976); The Life Functioning Questionnaire (LFQ) (Altshuler, Mintz, & Leight, 2002); (5) Global functioning disability: The Sheehan Disability Scale (SDS) (Sheehan, Harnett-Sheehan, & Raj, 1996); The Work and Social Adjustment Scale (WSAS) (Marks, 1986); The Social and Occupational Functioning Assessment Scale (SOFAS) (American Psychiatric Association, 2000).

However, functional outcomes are less frequently measured in clinical trials. Rather, attention is given to measuring symptom outcomes. The reviewed scales that assess social functioning are approximately 5 times less cited in depression outcome research than depression symptoms scales. Most of them have been developed recently (within the last 20 years), whereas most symptom measures were developed more than 40 years ago (McKnight & Kashdan, 2009). Moreover, several impairment assessment scales contain three items or less. For example, the social functioning scale of SF-36 contains 2 items. The Sheehan Disability Scale and The Work and Social Adjustment Scale contains 3 and 5 items respectively, while the SOFAS contains only 1 item. An overly brief questionnaire could lead to questions about their psychometric properties. Finally, differences were reported between depression measures and classifying patients into severity groups (Zimmerman et al., 2012). Change in social functioning is reported to occur in a complex and non-linear rate (Tweed, 1993), lagging behind depressive symptoms (Hirschfeld et al., 2002). Individuals who are screened out by depressive symptoms may not truly reflect depressive severity (Fried, 2014).

Horowitz and Vitkus (1986) pointed out the relationship between interpersonal process and interpersonal symptoms in depression and the importance of assessing interpersonal difficulties. According to them, symptoms are a complex subjective experience of interrelated cognitive, affective, and interpersonal components. Clarifying the interpersonal elements in the symptom cluster may help to reduce the overall level of symptom severity. The latest version of DSM-V proposed a greater emphasis on impairment and on a separation of functioning from symptoms, just as has been done in the International Classification of Functioning, Disability, and Health (ICF) checklist, which has separated the dimensions for symptomatology and impairment. The study urged that distress and impairment should remain an important dimension of assessment.

Parker et al. (1994) also recognized the importance of including social impairment in measuring depression severity. Therefore, in the 11-item self-report depression scale which they developed, they incorporated social impairment as a major outcome of severe depression. Unfortunately, in their scales, there were only two major dimensions - social and cognitive, with two items on mood. For the social domain, most attention was given to decrease in social activity, while other symptoms, such as deficits in social skills and interactions were not covered. Similarly, Ueda et al. (2011) proposed including social functioning measures in depressive scales in order to obtain an overall scale for assessing the interpersonal functioning of depressed individuals in full. This is particularly important for the cultural adaptation of depression measurement, which is a major consideration in research on ethno-cultural variations in depressive disorders. Many authors including Marsella (1985) have argued that DSM diagnostic criteria and the existing assessments are not culturally sensitive to various manifestations and expressions of depression.

1.3.3 Culture and depression

According to the definition by Marsella (1988), culture is defined as

"Shared learned behaviour which is transmitted from one generation to another for purposes of individuals and societal growth, adjustment, and adaptation: culture is represented externally as artifacts, roles, and institutions, and it is represented internally as values, beliefs, attitudes, epistemology, consciousness, and biological functioning" (p. 8-9)

The cultural conceptualization of depression is acknowledged in four areas of research. Research on explanatory models of illness (Kleinman, 1980) used illness narratives to demonstrate cultural conceptualizations of depression (Yeung, Chang, Gresham, Nierenberg, & Fava, 2004; Ying, 1990). Interdependent self-construal (Markus & Kitayama, 1991; Marsella, 1985) emphasized the social interpretations of psychological distress (Diener & Diener, 1995; Okazaki, 2002). Research on somatization highlights that somatic complaints are a social idiom of distress and representations of illness behaviour (Kleinman, 1977, 1986). Finally, factor analysis of self-report scales across cultures reveals cultural variation in factor loadings of symptoms (Ying, 1988; Ying, Lee, Tsai, Yeh, & Huang, 2000).

Kleinman (1977) first observed the somatization of depressive symptoms in Chinese people, which later became the most recognised feature of the manifestation of depression in China. The inclination to physical symptoms can be reflected from Chinese traditional literature and idioms that place bodily metaphors as the norm (Kleinman, 1977; Parker, Gladstone, & Kuan Tsee, 2001), making bodily symptoms more salient than psychological symptoms. This tendency towards somatization has been supported by a number of studies including Ryder et al. (2008) and Chan and Parker (2004). For example, Parker, Cheah, and Roy (2001) compared Malaysian and Australian Chinese samples and reported that Chinese patients had a greater tendency to nominate physical complaints that they have, in particular aches and pains, rather

than psychological problems such as depressed mood, and cognitive and anxiety items. Similarly, Kim, Kim, and Li (1999) compared Korean and Chinese depressed individuals and found that Chinese patients scored highest on loss of work and interest, loss of libido, sleeping problems and agitation on Hamilton's Rating Scale for Depression and Beck's Depression Inventory. Somatic presentations were later identified as the "idiom of distress" in the Chinese population. It is a socially approved form of illness behaviour under the influence of emotional restraint and the stigma of mental illness in Chinese culture (Kleinman, 1982). Marsella, Kinzie, and Gordon (1973) investigated White, Japanese and Chinese American depressed college students and also reported a qualitatively different symptomatology of depression between the three ethnic groups. However, recent studies have reported that somatization depends on the method of conducting research. Chinese depressed individuals are more inclined to somatize depressive symptoms during interviews. When they establish a relationship with their clinicians (Sue, Zane, & Young, 2005) or are probed with symptom checklists, they are able to acknowledge psychological and cognitive symptoms (Huang, Chung, Kroenke, Delucchi, & Spitzer, 2006).

1.4 Depression in China

A strikingly low prevalence rate of depression has been reported in Chinese populations (Lee et al., 2009). In the following sections (1.4.1-1.4.6), depression in China will be discussed together with discussion of the Chinese social, cultural and political contexts and how it shapes the expression of depressive symptoms in China.

1.4.1 China's political and social change and their impact on depression expression

Indeed, China's unique political movement during the Maoist era and the later economic reform made a great impact on people's experience and reporting of their

suffering, especially the interpersonal experience. The Maoist era and the Cultural Revolution put people into giving compulsory fidelity to the Communist Party and continuous class struggle (Tu, 1996). Chinese citizens experienced a highly collectivist way of living which involved a cycle of working, studying politically correct writings, and weekly meetings for "thought reform" (Wang, 1995). Deviating from the collectivist trend was regarded as unproleterian (Tu, 1996).

During that anti-intellectual era, mental illness was considered to be a product of moribund capitalism, and was attributed to the failure of the old political system. Treatment of mental disorders included reform and imposed labour together with insulin shock and unmodified electro-convulsive therapies (Kleinman & Mechanic, 1980; Yan, 1989). Moreover, the interpersonal expression of depression, such as social withdrawal could be criticized as "magnified individualism" that "cut people off from the masses" (Wang, 1995). Even showing affection for one's family could be publicly condemned as petty bourgeois sentimentalism that harmed the spirit for revolution (Tu, 1996).

Economic reform, led by Deng Xiaoping, began in 1978 and signified a transition to a market economy. Social life, means of relaxation, and entertainment were depoliticized and recognized as essential components of living (Lee, 1994). People expressed their subjective feelings and interpersonal experience more openly and gained more leisure time and private space (Lee, 1994; Wang, 1995). Economic and relational (*guanxi*) problems began to dominate people's daily hassles (Ikels, 1996). Around the same time, in 1979, China launched a population control policy that each couple should produce only one child in order to restrict population growth to the 1.2 billion benchmark (Hardee-Cleaveland & Banister, 1988; Jiao & Ji, 1986; Tseng et al., 1988). Following the launch of the policy the government initiated a series of measures including birth-control education, encouraging couples to marry late, and providing economic incentives for couples with one child. In the early years, health care funds together with honorary certificates were given to families with only one child. They also received a monthly subsidy until the child turned 14 years of age (Jing, Wan, &

Over, 1987). The policy was widely promoted through signage, billboards, television footage, and other sources of propaganda. From the start millions of people responded to the policy. Recorded in 1985, 80% to 90% of couples in urban areas and 50%-60% of couples in rural areas gave birth to only one child (Tseng et al., 1988). Over 70% of Chinese families had only one child (Jiao & Ji, 1986). In order to reinforce the effectiveness of a single child per family, brutal measures were also used including legalized abortion, forced sterilization, infanticide and compulsory abortion (Keng, 1997).

The one child policy is unique to China and has attracted global attention. Since it was launched it has been argued to produce adverse effects on the only child and also on children with siblings. Many researchers see the only child as socially deprived (Hall, 1987). An only child may be dependent on adults and attention seekers, and perform worse in cognitive skills and interpersonal competence, including independent thinking, persistence, cooperation, and peer prestige (Jiao & Ji, 1986). Since the launch of the one-child policy, Chinese society has tended to portray only children as 'good' and children with siblings as 'bad' (Yang, Ollendick, Dong, Xia, & Lin, 1995). Naturally, children with siblings might experience some discrimination due to a more negative view adopted by teachers. When comparing with their peers who were only children, they find it harder to enter school and as adults they receive less financial aid for medical care (Yang et al., 1995). This could possibly account for the higher level of depression and higher scores in neuroticism-anxiety and aggression-hostility in students with siblings than those without siblings (Wang, Du, Liu, Liu, & Wang, 2002). In addition, girls experience more pronounced gender discrimination especially in rural area of China. Girls with siblings would be more motivated to achieve success. Their lower self-esteem when compared with boys (Spillane-Grieco, 1984) can result in higher socially-oriented perfectionism, and a risk for higher anxiety (Flett, Hewitt, & Dyck, 1989) and depression (Wyatt & Gilbert, 1998). The one-child policy also influences the pregnancy experience of Chinese women as described in the next Chapter (section 2.3).

1.4.2 Epidemiology of depression in China

Asian countries have been generally recognized to have a lower prevalence in depression than Western countries (e.g. Lee et al., 1990; Chen et al., 1993; Demyttenaere et al., 2004; Chiu, 2004). Weissman et al. (1996) reported 1.5% of lifetime prevalence of depression in Asian countries like Taiwan, 2.9% in Korea, up to 16% in Paris, and 19% in Beirut. In the study by Andrade et al. (2003) which involved the investigation of 10 countries, they reported a lifetime prevalence of MDD ranging from 3% in Japan to 16.9% in the U.S. There have been few national studies of depression in China. In 1982 and 1993, two national surveys of mental disorders were carried out (Twelve Region Psychiatric Epidemiological Study Work Group, 1986; Wang et al., 1998). Only after 2000 did Chinese researchers begin to adopt diagnostic criteria and standardized interview instruments that are internationally recognized in psychiatric epidemiological surveys (Guo, Tsang, Li, & Lee, 2011), and they generated inconsistent results of depression prevalence. In recent studies, Ma and colleagues (2009) reported a lifetime prevalence of 5.3% in rural and urban populations in Beijing, China. A meta-analysis by Gu and colleagues (2013) involved 17 studies and gave rise to a lifetime prevalence of major depression rate of 3.3% (95% CI: 2.4-4.1), with a 12-month prevalence rate of 2.3% (95% CI: 1.8-3.4) and the current prevalence rate of 1.6% (95% CI: 1.2-1.9). They also reported a higher prevalence in females, rural areas and with CIDI. Comparable prevalence rates were found in Australian Chinese and Hong Kong Chinese samples (Wong, Xuesong, Poon, & Lam, 2011).

1.4.3 Help-seeking in Chinese individuals

A lower prevalence of depression in China is linked to Chinese people's help-seeking behaviour. For a long period of time, the explicit expression of emotion and psychological issues has been discouraged in Chinese society, as well as seeking professional help for psychological problems (e.g. Lee, 1999). Kung (2003) investigated help-seeking behaviour in 1,747 Chinese Americans in the United States

and reported that only 15% of Chinese American with a diagnosable mental disorder used a mental health service. Chinese individuals were less likely to report emotional distress until it became very impairing. This is named 'cultural stoicism' (Liao et al., 2012). It is reflected in a higher tendency to report persistent and impairing depressive episodes in the Chinese population in Australia with greater acculturation (Parker, Chan, & Tully, 2006). Rather, complaining about and seeking help for physical symptoms are more acceptable as a social norm. The Confucian tradition gives rise to the conceptual model of mental illness in Chinese people, namely that harmony in one's relationships and within oneself (a balance of mind and body) is responsible for one's good health (Tseng, 1975). Consequently, the traditional Chinese model of illness would expect interpersonal or somatic difficulties following depression, as these domains reflect a disharmony between people and soma and psyche (Ying, 1990). This model is in contrast to the Western conception that depression is psychocentric (Tseng, 1975).

Another reason that prevents help-seeking behaviour is stigma. Hsu et al. (2008) reported higher stigma in Chinese Americans than Caucasian Americans. They also report social communication of distorted attitudes, and a social consensus and societal sanction as major contributors to stigma. It is thus possible for Chinese to suppress and hide their illness due to powerful social stigma that the society places on mental illness (Chan & Parker, 2004). Wong, Wu, Guo, Lam, and Snowden (2012) reported much lower levels of mental health literacy in Chinese people than in Australians and Canadians. In Chinese culture, mental illness is greatly stigmatized (Tsang, Tam, Chan, & Cheung, 2003). People with mental health issues may be seen as dangerous, unpredictable and incurable (Martin, Pescosolido, & Tuch, 2000). Consequently, Chinese people may consciously or unconsciously be reluctant to perceive and describe their condition as mental. Rather, a strong cultural tendency drives them to regard their personal and social distress in more socially acceptable terms (Kleinman, 1986). Stigma for people with psychiatric conditions has been reported to be even more pervasive in Mainland China than in other areas such as Hong Kong and Australia (Wong et al., 2012).

1.4.4 Neurasthenia in the diagnosis of depression in China

In 1869, America neurologist George Beard conceptualized the term "neurasthenia" to denote "exhaustion of the nervous system" (p. 217), which embraces a mixture of weakness, fatigue, poor concentration, memory loss, severe headache, poor appetite, and over 70 other symptoms. Becoming popular upon its introduction and remaining so until the 20th century, the term was possibly passed on to China in the early 1900s from Japan. *Shen* refers to an "emblematic of vitality, the capacity of the mind to form ideas, and the desire of the person to live life". *Jing* originally refers to the "meridians or channels which carry *qi* ("vital energy") and *xue* ("blood") through the body". "Conceptually, *shenjing* is treated by both Chinese physicians and lay people as one term that may mean nerve, or nervous system" (World Psychiatric Association, 2002, p.29). *Shenjing* can degenerate (*shuai*) and weaken (*ruo*) after nervous excitement, leading to a variety of psychic and somatic symptoms (Lee, 1994; World Psychiatric Association, 2002). The term was readily accepted by mental health professionals and lay people to connote a disorder (Lee, 1998) as it is closely coherent with the non-stigmatized conceptual category in Chinese medicine of weakness (*xu*). Deviating from the folk expression of *Shenjing bing*, *Shenjing Shuairuo* refers to people who don't have a jeopardized mind and are not a hazard to the society (Kleinman, 1988). From 1950s to 1980s, it was the most popular diagnosis and gave rise to a prevalence of 80-90% of patients (Kleinman, 1982). However, its popularity declined after the mid-1980s (Zhang, 1989). Around that time, neurasthenia was rejected by DSM-III and DSM-III-R, following which the DSM hierarchical configuration of symptom diagnosis emerged. Neurasthenia was regarded as an unreal disease. A well-cited study in Hunan (Kleinman, 1982) pointed out a re-diagnosis of 87% of neurasthenia patients for DSM-III depression and who responded favourably to tricyclic pharmacotherapy, whereas neurasthenia patients did not. Following the rapid social change after the Maoist era, there was increasing communication between Western and Chinese psychiatry and a powerful influence by the pharmaceutical industry on the use of antidepressants (Lee, 1994). In addition, the Chinese Classification of Mental Disorders (CCMD) was developed in China, including four editions published in 1981 (first edition), 1989 (second edition), 1995 (second-revised edition), and 2001 (third

edition) respectively (Chen, 2002). The third edition of CCMD (CCMD-3) adopted a symptom hierarchy resembling that of DSM and was the longest of all the editions (Chen, 2002). Greater coherence of the CCMD to internationally accepted DSM-IV and International Classification of Diseases—10th Revision (ICD-10) led to the inclusion of the category of somatoform disorder in CCMD-3 (Lee, 1999). It also required neurasthenia to be diagnosed after all anxiety and depressive disorders had been ruled out. However, neurasthenia is still widely accepted in both urban and rural China, despite the growing popularity of the concept of depression among better educated, middle-class Chinese and younger people in general. The usage of *Shenjing Shuairuo* started to decline from the mid-1980s and by 1997, depression was titled in an international psychiatry conference in China and neurasthenia was no longer included (Lee, 1999).

1.4.5 Chinese collectivism and the contribution to interpersonal stress

It has been well recognized that the Chinese are more collectivist than many other ethnic groups (Van de Vliert, Yang, Wang, & Ren, 2013) due to their Confucian background (Nisbett, 2005). Despite a popular view that China has been undergoing transition from a collectivistic to a more individualistic culture (Kleinman & Kleinman, 1999; Lin, 2009) recent studies still demonstrate the collectivistic characteristic of Chinese society. For example, Tu, Lin, and Chang (2011) compared individualism and collectivism among four BRIC countries (i.e. Brazil, Russia, India, and China) which are anticipated to become wealthier than the majority of current major economic countries by 2039. They discovered that China has the highest collectivist attitude among the four countries. Oyserman, Coon, and Kemmelmeier (2002) conducted a meta-analysis of 50 studies and made regional and country-level comparisons of individualism and collectivism with America as a reference country. They reported a large and significant effect size of collectivism when China was compared to the USA. In particular, “maintaining group harmony” dramatically sharpened the effect size, suggesting that it is the central component of collectivism in the Chinese population. Interestingly, a robust effect was found for Chinese-speaking areas. The study did not

differentiate the level of collectivism among Taiwan, Hong Kong or Mainland China. Collectivism was found to be adopted more by the Chinese (from Mainland China, Taiwan and Hong Kong) than by Japanese and Korean people. Among different geographic areas of China, Van de Vliert et al. (2013) found varying levels of collectivism. The North part of China, including Heilongjiang, Jilin, Liaoling and Inner Mongolia, were found to score highest in collectivism, while the southern parts of China, such as Shanghai, Guangdong, are less collectivist and Hong Kong is the most individualistic area.

The region from which the study of the thesis was conducted, the Inner Mongolia Autonomous Region, is located in the northern part of China (Figure 1). Despite being an ethnopolitical and territorial entity, it has been recognized to exist only in name (Bulag, 2005). Indeed, many people confuse Inner Mongolia with Outer Mongolia. Inner Mongolia shares most of its border with Outer Mongolia, which gradually split into separate countries under the influence of Russia after the Republic of China was established in 1911. Inner Mongolia became one of the ethnic minority provinces of China in 1947. Its population is 79% Han, 17% Mongol, 2% Manchu, 0.9% Hui and 0.3% Daur. Both Mandarin Chinese and traditional Mongolian are the official languages in the region. Inner Mongolia possesses unique characteristics, influenced by major political powers including Russia, Mongolia, Japan and China rather than Western countries (Bulag, 2005), whereas other parts of China have been in direct contact with Western countries. Japan plays an important role in modernity in Inner Mongolia. The Japanese Empire established a political entity, named Manchukuo, in Mongolia before the Second World War. It is believed that Manchukuo laid the material and conceptual foundation for the later establishment of the Inner Mongolia Autonomous Region (Bulag, 2005). As a result, Western culture does not influence Mongolian society the same way as it influences other parts of China. On the contrary, the influence and close association with a highly collectivistic Japan could contribute to greater extend of collectivistic characteristics in Inner Mongolia in comparison with other areas of China. Moreover, the capital city, Hohhot, has been categorized as the third-tier city in the latest China-city ranking. It lags behind 1st and 2nd tier cities in

terms of economic development (Cheng, 2016), which could also be a factor that influence people's perception of mental illness. As a result, Inner Mongolia populations are studied in this thesis because they could conceptualize depression in a slightly different way than populations in other parts of China.

Figure 1. Location of Inner Mongolia in China

The collectivist culture in Chinese society thus emphasizes interpersonal relatedness which includes interpersonal harmony, adherence to reciprocal interactions, preventing loss of face, and positioning the self with reference to family and community relationships (Triandis, 1989, 2001). The relational concepts of psychological well-being have been demonstrated to be more connected to individuals from collectivistic cultures than self-focused ones (Diener & Diener, 1995; Okazaki, 2002; Suh, Diener, Oishi, & Triandis, 1998). In line with this finding, Mo and Mak (2009) traced Chinese people's help-seeking behaviour to a low perceived level of control and interpersonal relatedness, suggesting the influence of the collectivistic culture of Chinese society.

Chinese people experience stress that arises from intergenerational relationships and

family contexts that affect their mental wellbeing (Kleinman, 1980). Relationships with others, especially with family members, is greatly emphasized in Chinese society (Hwang, 2001). An individual's self is embedded in the family, which is regarded as the 'great self' (da wo) in Chinese culture (Bedford & Hwang, 2003). It is a crucial role for one in the family to maintain its harmony (Hsiao, Klimidis, Minas, & Tan, 2006). This is unlike the Western culture, which conceptualizes one's self as his autonomy (Singh, Huang, & Thompson, 1962). The Chinese standard for being a person (zuo jen) is for an individual to behave according to the expectations set by the society and culture, so that a satisfactory level of psychic and interpersonal equilibrium is achieved (Hsu, 1971).

Traditional Chinese culture relies on Confucianism to determine the rules for maintaining appropriate interpersonal relationships, classifying social relationships, and maintaining appropriate behaviour towards others. There are five major cardinal relationships (*guanxi*) defined by Confucians: sovereign and subordinate, father and son, husband and wife, elder brother and younger, and between friends. Most of the five relationships are between superior and inferior, except that between friends. An individual's identity is judged according to his or her relation to the group. For each of the 10 roles, the superiors (the father, elder brother, husband, and ruler/elder) should behave with kindness, gentleness, righteousness and benevolence, respectively. By contrast, the son, younger brother, wife, juniors or minister should behave to the standards of filial piety, obedience, submission, deference and loyalty. Failure to fulfil the expectation of one's role could lead to conflicts with others (Hwang, 1987). As a result, personal duties and social goals were marked by Confucian rationalism versus the personal rights of Western individualism (Bedford & Hwang 2003).

The sense of responsibility and obligation towards family and group that Chinese individuals often have can result in feelings of guilt when they fail to fulfil their duty (Hsiao et al., 2006). Similarly, a feeling of shame occurs when one judges his or herself negatively (Hultberg, 1988). In Confucian cultures, the failure to live up to one's

identity in the social hierarchy can lead to the feeling of shame, which in turn jeopardizes individual and social relationships (Hwang, 2001). In the study by Hsiao et al. (2006) who used qualitative methods to capture the experience of suffering of Chinese with mental illness, their finding was consistent with traditional value of Confucianism. Chinese people regarded interpersonal interactions as the primary source of stress, which is activated when their behaviour failed to meet the cultural norm and fulfil their Confucian anticipated role. In particular, if Chinese children fail to succeed and honour their families, they perceive themselves as bad sons or daughters. Li, Costanzo, and Putallaz (2010) also found a higher collectivism socialization goal amongst Chinese college students, consistent with previous research that Chinese parents endorse filial piety socialization goals in their children (Chao, 2000). Filial piety socialization goals aim to socialize children to fulfil their responsibility towards their parents and family, such as showing respect and obedience, providing material and emotional support for their parents and bringing honour to the family by achieving academic and occupational success (Li et al., 2010). A similar study by Tam and Wong (2007) explored the dysfunctional attitudes of Chinese depressed patients using semi-structured interviews. They reported that interpersonal and family issues were the dominant theme in the dysfunctional attitudes of Chinese depressed individuals. They identified 'vulnerability', 'need for approval', 'role performance within family hierarchy', 'familial harmony', 'relational harmony', 'imperatives', 'fate', 'face', 'fairness', and 'success-perfectionism' as the themes to capture participants' dysfunctional attitudes. The studies highlighted the important role of interpersonal stress in depression in the Chinese community.

1.4.6 Chinese experience of depression and its implications for measurement

It has been proposed that the difference in prevalence may not reflect a true distinction but that cultural difference could lie in definition and measurement (Kalibatseva & Leong, 2011; Kirmayer & Jarvis, 2006; Van Ommeren, Sharma, Makaju, Thapa, & De Jong, 2000). Indeed, the western criteria of depression diagnosis and definition may not be present, or may present in different forms in other cultures, yielding

misleading or erroneous comparisons (Littlewood, 1990; Mezzich et al., 1999). This is described by Kleinman (1977) as `category fallacy'. Secondly, the cross-cultural application of an identical diagnostic method and criteria may result in various levels of severity across different language or cultural groups. As a result, the observed differences in depression prevalence may point to linguistic or cultural differences in reporting distress across nations (Kleinman, 1988; Lewisfernandez, 1996). The comparatively lower prevalence in Asia and China has led to discussions that cultural differences or variations in risk factors may have an impact in the expression of MDD (Weissman et al., 1996). In particular, factors could be attributed to differences in vulnerability to depression due to ethnicity, various exposures to stressors or traumatic events (e.g. political repression, rapid cultural shifts, socioeconomic deprivation and threat of violence) across communities (Weissman et al., 1996).

A cross-cultural perspective has debated whether or not depression implies a set of universal criteria of diagnosis and a culturally specific variability in depression expression (Canino & Alegría, 2008). The well-adopted criteria of depression diagnosis, DSM-IV/V, has been criticised for its basis on personhood in Western societies, endorsing autonomy, voluntarism, and individualism (Fabrega, 1996), while it ignores consideration of symbolic personal characteristics such as motives, intentions, social standing, power, spiritualism, values, ethics, and life goals (Fabrega, 1996). Furthermore, in collectivist cultures the interdependence of the self is ignored in the criteria, and the experience of somatic and interpersonal symptoms of depression is encouraged by the society (Kalibatseva & Leong, 2011). At the same time, the western conception of depression has been widely assumed to fit the Chinese, thus hindering further study on cultural expression of depression in China (Wong, 2009).

Among the very few studies that have directly explored depressive symptom patterns in Chinese people, an early study in China by Zheng, Xu, and Shen (1986) provided a crucial insight into the cultural specificity of symptom content in the Chinese construct, and how it varied from the content of western measures. It is one of the few studies which directly matches the thesis topic so it will be discussed in depth. Based on

Marsella (1980) hypothesized psychological and somatic patterns of emotional expression, this study examined Chinese verbal expression of typical western depression terms. The clinical and community sub-samples in the study were given 16 key depressive symptoms. They could use their own words to describe each symptom or retain the original term. The study reported four styles including psychological, somatic, neutral (psychological and somatic), and deficient (absence of expression due to suppression or denial). Three out of the 16 original terms were retained (agitation, fearful, and self-pity), and three terms (being punished, suicidal interest, and weight loss) were reported to be socially inappropriate. This study pointed to the non-equivalence in Chinese interpretation of many concepts of western symptoms. It also acknowledged the importance of choosing appropriate verbal expressions. Three prominent patterns of verbal expressions and illness conceptions emerged from the study.

The first pattern was a culture-specific psychological style to express psychological key terms. Expressions could be categorized into three types: single-word feeling states, behaviourally or mind-focused descriptions of functioning, and philosophical or descriptive statements focusing on life rather than statements from a first person perspective. Examples of single-word feeling states included 'depressed' with 'agitation' and 'uncheerful, unhappy, or unenjoyable,' and 'anxious' with 'worry' and 'agitation.' Mind-focused descriptions included, 'It hurts my brain,' 'hesitate to make decisions,' and 'don't know how to deal with things' to represent 'indecisiveness.' Indirect philosophical statements such as 'life has no flavour' to represent 'loss of interest, and 'being alive is not interesting' and 'thinking about death' for 'suicidal interest.' The clinical group used the psychological style significantly more for 'depressed' and 'suicidal interest' than the community group, which largely provided no expression for 'suicidal interest.'

Secondly, their participants expressed psychological key terms in terms of interpersonal concepts and terms with cultural nuances in meaning. Specifically, they described feeling states in terms of relationships and behaviours. For 'guilt,' they expressed in regards to self-focused ethical behaviour, such as, 'I don't deal with things well,' 'want to apologize to others,' and 'ashamed because of bad actions.' For

‘failure, they expressed ‘feel less capable than others,’ ‘feel foolish,’ and ‘I am a weak person’ with a reference to being judged or social comparison. For ‘hopelessness,’ they used ‘no one understands or cares about me,’ ‘lonely,’ and ‘friendless’ as they interpreted the concepts as cut-off relationships. For ‘self-pity,’ they used ‘unfortunate’ and ‘unlucky,’ which refers to the notion of fate.

Thirdly, participants also expressed psychological concepts in terms of body words, especially heart and brain. They also used behavioural or contextual descriptions for somatic key terms. Heart expressions included ‘heart beating’ as the most common expression for ‘fearful.’ ‘Uncomfortable inside heart’ was the most common expression for ‘depressed’, and the third most common for ‘anxious.’ ‘Intolerable inside heart’ was chosen for ‘agitated.’ Brain expressions included, ‘brain becomes stupid,’ and ‘I cannot use my brain.’ Behavioural descriptions included ‘I don’t want to do anything’ for ‘tired,’ and ‘don’t want to eat anything,’ ‘can’t eat,’ and ‘no taste in my mouth’ for ‘poor appetite.’ Despite the significantly higher somatization scores on the SCL-90 of clinical groups, similar levels of somatic expression of emotional concepts were found between clinical and community groups. ‘Lack of sexual drive’ was mostly expressed by the community sample in deficient style. The participants, most frequently in the clinical group, answered the question using contextual descriptions such as ‘no sexual energy due to poor health’ and ‘no interest in the opposite sex.’

Consistent with the finding by Zheng et al. (1986), using the Chinese Depressive Symptom Scale (CDS) by Lin (1989), common idioms of social relations and unpleasant past events related to Chinese constructs were added into the Center for Epidemiologic Studies Depression Scale (CES-D) (Radloff, 1977). These items are “I have felt I have a lot to talk about but can’t find the opportunity to say it”, “I feel suffocated,” “I feel suspicious of others,” “I don’t think others trust me”, “I don’t think I can trust others”, and “I remember unpleasant things from the past.” The last item specified the deranged social relations during the Cultural Revolution (Kleinman,

1995). The other symptoms on the scale were built upon the concept of CES-D, including depressed mood, guilt, worthlessness, helplessness and hopelessness. Another scale, the Chinese Health Questionnaire in Taiwan, was developed by Cheng and Williams (1986) and Cheng, Wu, Chong, and Williams (1990). It measured psychiatric morbidity in the community. The scale included six western items regarding the psychological aspects of depression and anxiety and sleep disturbance. Six cultural-specific items on somatic and interpersonal domains were added, including headache or pressure in the head, heart palpitations and worry about heart trouble, chest discomfort or pressure, limb numbness or shaking, relationships between family or friends, and worry about family or close friends (Cheng & Williams, 1986; Cheng et al., 1990). Unfortunately, this knowledge of the Chinese presentation of depression has yet to be addressed in validation and development of self-report scales in current research into antenatal depression in China. Cross-cultural research on depression assessment has largely focused on the validation of western self-report inventories, often under the assumption that items have the same psychological meaning for all subjects (Zhang et al., 2011) .

Zheng and Lin (1991) in their Chinese Depressive Inventory (CDI), also replaced the items for depression, suicide, sexual drive and sense of failure in the BDI with 'being uncomfortable in one's heart,' 'being alive is not interesting,' 'not interested in the opposite sex,' and 'a weak person in life,' respectively. This resulted in an improvement of construct validity. Similarly, Chan, Parker, Tully, and Eisenbruch (2007) adapted the Depression in Medically Ill (DMI-10; Chan et al., 2007) with idiomatic and psycho-linguistically equivalent items to improve reliability considerably. For example, they replaced the terms 'vulnerable,' 'less worthwhile,' and 'keeping a distance from others' with terms that mean 'emotions getting hurt,' 'not having usefulness,' and 'not willing to socialize' and largely improved the cross-cultural validity of the Chinese DMI-10.

Lu, Bond, Friedman, and Chan (2010) found a four-factor structure of CES-D for Hong Kong Chinese depressed individuals including negative/depressed affect,

positive affect, interpersonal problems, and somatic symptoms, though there was a greater tendency for Chinese to report somatic symptoms. Wong et al. (2012) in their development of a culturally sensitive depression assessment scale for Chinese Americans, found that a Rasch Partial Credit Model of 42 items including psychological, somatic and interpersonal domain of depression best fits the data from the Chinese American sample. They discovered that Chinese participants expressed interpersonal symptoms, including being judged, social comparisons and cut-off relationships as a replacement for psychological distress. For example: “Feel less capable than others” denoted “failure”, and “no one understands or cares about me” and “friendless” referred to “hopelessness”. These studies show that the interpersonal domain of depression should be included in capturing the full symptom pattern of depression in China.

1.5 Chapter summary

This chapter provides a review of the general features of major depression, especially the important role that interpersonal symptoms play in depression. Cultural manifestations of depression are also discussed, including the importance of interpersonal functioning in collectivistic Chinese society. The next chapter will introduce the research findings on antenatal depression, the adverse outcomes, and the risk factors. In particular, a review will be given of a body of research on symptoms during pregnancy in China and in Western countries. The next chapter will also account for the challenges that Chinese pregnant women face and how social and cultural factors may shape their experience of antenatal depression.

CHAPTER TWO

ANTENATAL DEPRESSION IN PREGNANT WOMEN AND ITS EXPRESSION IN A COLLECTIVIST SOCIETY

2.1 Chapter overview

In the previous chapter an overview of depression was provided and the impact of culture, especially Chinese culture, on depression was explored. Previous studies on the expression of depression among Chinese individuals have revealed the experience of somatic and interpersonal symptoms. A description of how collectivism and Chinese medicine impact on the experience of depression, combined with the social, political and cultural environment of China, was considered. In this chapter the focus is on depression amongst pregnant women in China. Pregnant women may encounter difficulties during pregnancy that are different from those of women in Western societies. In particular, the son preference in China and family dynamics, the birth-control policy, and the difficulties in work-life balance can shape their unique pregnancy experience and expression of depressive symptoms. Antenatal depression literature based on Western populations cannot thus be directly assumed to be applicable to the women living in the traditional Chinese culture of Inner Mongolia. This chapter will begin by providing a general introduction to the previous findings on antenatal depression, and it will then proceed to describe the sociopolitical environment in China, as well as the stressors that are associated with symptom expression in Chinese pregnant women in Inner Mongolia.

2.2 Antenatal depression overview

Over many decades, the traditional perspective regards pregnancy as an important period of satisfaction and emotional welfare. It is commonly viewed as a blissful time when mothers-to-be are protected from mental disorders (Lacunza & Martinez-

Cengotitabengoa, 2015). Indeed, most women regard pregnancy as a desired event which does not come with marked negative psychological changes (Bjelanović et al., 2012). Psychological disorders during pregnancy were first recognized in 1985 (Oppenheim, 1985). Since then, growing evidence indicates that a percentage of pregnant women may show anxiety, depression, somatization, psychosis, paranoia and disorganized behaviour (Bjelanović et al., 2012). Indeed, pregnancy is a major life event and is also a potentially stressful period (Bennett, Einarson, Taddio, Koren, & Einarson, 2004), during which pregnant women adapt to various psycho-social and physiological changes (Hodgkinson, Wittkowski, & Smith, 2014; Niemi, Nguyen, Bartley, Faxelid, & Falkenberg, 2015). These changes include their social roles and self-definitions. Pregnant women are thus vulnerable to depression (Roberts et al., 1996). Systematic reviews have also identified a range of risk factors that are associated with antenatal depression, including: week of pregnancy, low socio-economic status, unhealthy behaviour such as smoking, previous prenatal loss, lower perceived social support, years of schooling, being unmarried, experience of domestic violence, negative response to the pregnancy by the father of the child, unplanned pregnancy, a previous pregnancy or delivery complication and fear of childbirth, and a history of depression (Abajobir, Maravilla, Alati, & Najman, 2016; Blackmore et al., 2011; Koleva, Stuart, O'Hara, & Bowman-Reif, 2011; Leigh & Milgrom, 2008; Raisanen et al., 2014; Rich-Edwards et al., 2006; Stewart, Umar, Tomenson, & Creed, 2014; Tebeka, Strat, & Dubertret, 2016).

Until recently, more clinical and research attention has been given to postnatal depression (PND) than to antenatal depression (Lee et al., 2004; Stewart et al., 2013). However, growing research evidence suggests that postpartum depression could begin during pregnancy. For example, Wisner, Sit, McShea, and et al. (2013) reported that 33% of participants with postnatal depression started to have the disorder during pregnancy. However, antenatal depression has not been acknowledged until the latest version of the Diagnostic and Statistical Manual of Psychiatric Disorders (DSM-V) (APA, 2013) was produced, which expanded the specifier "with postpartum onset" used in previous versions for the diagnosis of major depression episode to "with peripartum onset". The new version of DSM placed its onset of Major Depressive

Episode into pregnancy, yet still restrained the duration of the postpartum period to 4 weeks. The modification in DSM-5 highlights the importance of managing mood disorders during pregnancy (Uher, Payne, Pavlova, & Perlis, 2014). However, merging DSM-5 prenatal and postnatal depression into one single specifier could hinder understanding of the potential differences in clinical presentation (Altemus et al., 2012) of depression in these two periods.

The importance of identifying depression during pregnancy has been highlighted by The American College of Obstetricians and Gynaecologists, in its latest committee opinion paper. This paper recommends screening for depression at least once during the perinatal period using a standardized, validated tool. Following which should be an appropriate follow-up diagnosis and treatment. Close monitoring, evaluation, and assessment is important for those with a history of depression, mood disorders, or other risk factors (American Congress of Obstetricians and Gynecologists, 2015). In the UK, the National Institute for Health and Care Excellence (NICE) guidelines recommended that health professionals including midwives, GPs, health visitors and obstetricians provide a quick and simple screening at first consultation with pregnant women asking them about the presence of depressed mood and loss of interest as depression identification questions. It also suggested that the Edinburgh Postnatal Depression Scale (EPDS) or the Patient Health Questionnaire (PHQ-9) to be used further assessments as part of a full assessment (NICE, 2014). However, such guidelines have not been introduced in China despite increasing awareness on antenatal depression.

Not only can depression begin in pregnancy, antenatal depression has been found to have a high prevalence. A meta-analysis of 21 studies reported the mean prevalence rate across the antenatal period to be 10.7% (Bennett et al., 2004). However, the prevalence could be up to 42.7% in some populations (Imran & Haider, 2010). In some studies, the prevalence rate is higher than that of postpartum depression. A systematic review of cohort studies yielded a percentage of 14 (95%CI 13.5-14.5) as the prevalence of antenatal depression, compared to 10.5% (95%CI: 10.1-10.9) pooled

prevalence of postnatal depression (Maullik, Patel, & Langham, 2005). Chee et al. (2005) also found a higher prevalence rate for antenatal depression (12.2%) than for postnatal depression (6.8%) in Asian countries. Studies have yet to reach an agreement on the pregnancy trimester with the highest depression prevalence. Some studies reported that women in their first and third trimesters are at highest risk of developing antenatal depression (Field, 2011; Gavin et al., 2005; Marchesi, Bertoni, & Maggini, 2009). This could be because women in the early stages of pregnancy often experience more severe daily hassles than in the later stage of pregnancy. In the second and third trimesters, the daily hassles they experience become more frequent but less severe. At these periods, pregnant women also reported less intense uplifts, probably due to fatigue and changes in bodily stature that pose restrictions on uplifting activities, or due to concerns for delivery, baby care, and parenthood (Thompson, Murphy, O'Hara, & Wallymahmed, 1997). For example, Rofé, Littner, and Lewin (1993) identified the highest level of anxiety and emotional distress in the third trimester but the highest frequency of somatic complains in the first trimester. There is also evidence to support the idea that profound somatic complaints have been found across all trimesters. An investigation carried out by Rodriguez, Bohlin, and Lindmark (2001) throughout pregnancy documented a high prevalence of fatigue (60%) that occurred in high frequency (30% participants experienced it 3 times or more each week). The other somatic symptoms included poor appetite (25% experienced occasionally and 5% frequently), and poor sleep (about 40% experienced it occasionally and 8-17% frequently). In addition, a study carried out on 34 pregnant women by Coble et al. (1994) found that the somatic symptoms, especially low energy, were reported most frequently among the pregnant sample. Women in their third trimester of pregnancy are also reported to experience the worst sleep disturbance (Pien & Schwab, 2004). The former could be attributed to the physiological changes following pregnancy and the latter could be due to the preparation for birth. In some other studies only the third trimester has been found to be more vulnerable to depression than the other times of gestation (Bennett et al., 2004). Similarly, Records and Rice (2007) documented the extent to which women in the third trimester experience antenatal depression. Over one third of women scored above the clinical cut-off for depressive symptoms during

the third trimester on the CES-D scale. The rate was much higher than the prevalence rate reported in previous studies (Kessler, 2003; Kessler et al., 2005).

Despite its high prevalence, antenatal depression is frequently missed in community clinic settings, and more frequently than several other mental disorders (Smith et al., 2004). In the United States and Australia, only a small percentage of obstetricians ask about depression in their patients, and 80% of them were not trained in treating depression (Schmidt, Greenberg, Holzman, & Schulkin, 1997). In contrast to its high prevalence, it is more likely to be under-detected and untreated (Sidebottom, Harrison, Godecker, & Kim, 2012) in obstetrics/gynecology clinic settings than other major mental health disorders (Smith et al., 2004). Even when identified, depression is not frequently acknowledged as a problem in clinic records. Marcus, Flynn, Blow, & Barry (2003) screened 3,472 pregnant women and found that 20% of them scored above the cut-off on the EPDS but only 13.8% received treatment for depression. Bowen and Muhajarine (2006) also suggested that antenatal depression could be underdiagnosed due to depressive symptoms being attributed to pregnancy-related physical and hormonal changes.

2.2.1 Adverse outcomes of antenatal depression

The adverse impact of antenatal depression on foetal and maternal wellbeing has been reported in numerous studies in different cultural populations (e.g. Teixeira et al., 1999; Copper et al., 1996; Hedegaard et al., 1996; Lou et al., 1994; Perkin et al., 1993; Wadhwa et al., 1993). The adverse consequences that antenatal depression has on the development of postnatal depression has been recognized as the strongest risk factor for postnatal depression (Eastwood, Ogbo, Hendry, Noble, & Page, 2017; Leigh & Milgrom, 2008).

Antenatal depression can also reduce antenatal clinic attendance and women's capacity for self-care, exposing women to a higher risk of inadequate nutrition including poor dietary intake (Saeed, Raana, Saeed, & Humayun, 2016), and drug and alcohol abuse (Austin & Lumley, 2002; Zuckerman, Amaro, Bauchner, & Cabral, 1989). All of these can compromise women's physical and mental health and restrict foetal growth and development (Austin & Leader, 2000; Hedegarrd, Henriksen, Sabroe, & Secher, 1993; Hoffman & Hatch, 2000; Oberlander, Warburton, Misri, Aghajanian, & Hertzman, 2006; Rahman & Creed, 2007; Saeed et al., 2016; Vesga-Lopez et al., 2008). In particular, women with antenatal depression have been found to have poor health (Marcus et al., 2003; Orr, Blazer, James, & Reiter, 2007), and greater anxiety (Breitkopf et al., 2006; Hart & McMahon, 2006).

Antenatal depression may also increase risks to the birth process itself. Larsson, Sydsjö, and Josefsson (2004) found that pregnant women with depression were more likely to experience pregnancy complications such as acute or elective caesarean sections, instrument-assisted delivery (Andersson, Sundstrm-Poromaa, Wulff, strm, & Bixo, 2004), perineal tears, excessive bleeding, premature contractions, back pain and pre-eclampsia (Kurki, Hiilesmaa, Raitasalo, Mattila, & Ylikorkala, 2000). They also have a greater risk for premature contractions, back pain and shorter gestational age by 1 week. Similarly, Andersson et al. (2004) postulated an association between depression in the second trimester and increased nausea and vomiting, prolonged sick leave during pregnancy and increased number of visits to obstetrician especially regarding fear of labour and contractions. It is also related to higher prevalence of epidural analgesia and planned caesarean section. Grigoriadis et al. (2013) reported in their systematic review and meta-analysis a significant association between premature delivery, decrease in breastfeeding initiation and antenatal depression in the third trimester.

There is a growing body of literature on the links between pregnancy-related depression and infant development. Before birth, the foetuses of women with antenatal depression showed less movement and a reverse trend of increased heart rate (Field,

2011). Subsequent effects of prenatal depression on the outcome of foetuses included growth restriction, prematurity, low birth weight and adverse social and cognitive development in infants (Eastwood et al., 2017; Grote et al., 2010; Liu, Cnattingius, Bergström, Ö stberg, & Hjern, 2016). Moreover, babies of depressed mothers are found to be less responsive to stimulation, including physical stimulation (Monk, Spicer, & Champagne, 2012), faces and voices (Field, Diego, & Hernandez-Reif, 2009). Less interaction with the infants was also found among dysthymic mothers (Field, Diego, Hernandez-Reif, & Ascencio, 2009b). Disrupted maternal responsiveness can influence mother-infant interaction and is associated with children's development in later stages of their lives (Pearson et al., 2011). Moreover, sleep problems were also found in babies of depressed mothers later in infancy and early childhood (O'Connor et al., 2007). Indeed, depression during pregnancy is a risk for adverse emotional and cognitive development in children, including violence in adolescence (Hay, Pawlby, Waters, Perra, & Sharp, 2010). Some research suggests that babies of depressed mothers may be developmentally delayed at 18 months (Deave, Heron, Evans, & Emond, 2008). A longitudinal study in the Netherlands documented externalizing and internalizing behaviour problems in children aged between 14 and 54 months (De Bruijn, Van Bakel, & Van Baar, 2008). Longer-term outcomes have also been reported with evidence of behavioural problems in children up to 8-9 years of age, with the presence of antenatal depression in their mothers in the third trimester (Luoma et al., 2001).

2.2.2 Depressive symptoms during pregnancy

Antenatal depression has an unclear picture in terms of its onset, chronicity, severity, and relapse (Steiner, Dunn, & Born, 2003). Diagnosis is based on timing rather than symptomatology (Lusskin, Pundiak, & Habib, 2007). Depressive symptoms such as fatigue, emotional lability, sleep disturbance, and appetite changes could result from physiological processes during pregnancy. Even in the absence of clinical implications, pregnant women may still experience them (Lacunza & Martinez-Cengotitabengoa,

2015). Studies have also found that pregnant women without depression may already be experiencing discomfort, which hinders the study on depressive symptoms when targeting pregnant women. Section 2.2 also gave a review on the bodily discomforts pregnant women, especially those in late pregnancy, often experience. Otchet, Carey, and Adam (1999) reported a significantly poorer quality of life compared to their non-pregnant counterparts in the third trimester and into the postnatal period, including greater bodily pain, worse physical functioning, and greater functional limitations because of physical health problems. Furthermore, pregnant women are found in studies to have more elevated depressive symptoms than non-pregnant ones. For example, Zhang, Chen, Zhong, Jiang, and Lin (2009) assessed pregnant women in all three trimesters with the self-report Symptom Checklist 90 (SCL-90) and Zung's depression rating scale (SDS). They identified a higher score for depression in pregnant women than in non-pregnant women. Kayak, Poddar, and Jahan (2015) investigated pregnant women in their third trimester of pregnancy with the self-report Symptom Checklist 90 (SCL-90) and General Health Questionnaire (GHQ-28) and reported higher scores of somatization, interpersonal sensitivity, depression, anger, hostility, phobic anxiety, psychotism, and sleep disturbance and disrupted appetite than non-pregnant women. In general, early pregnant women come across more mental health issues than non-pregnant women. These findings thus lead to a heated debate on whether antenatal depression remains a distinct diagnostic category with a unique clinical presentation (Manber, Blasey, & Allen, 2008) and whether it is caused by specific neurobiological or psychological mechanisms of pregnancy (Uher et al., 2014). It is thus important for researchers and clinicians to identify valid indicators of depression during pregnancy and to treat women at high risk of mood disorder both adequately and effectively.

A major controversy lies in the somatic symptoms of depression and the natural experiences of pregnancy. As mentioned in section 2.2, non-depressed pregnant women also experience somatic complaints. However, somatic symptoms are found to have profound effects on depressive symptoms. For example, somatic-related symptoms are found to contribute primarily to the total depression scores on a sample

of 882 “non-psychiatric” pregnant women (Salamero, Marcos, Gutiérrez, & Rebull, 1994). Manber et al. (2008) also found the highest elevation of somatic symptom severity in looking for the symptom profile of depressed pregnant women. Supporting evidence has emerged from recent studies to support that depression worsens physical discomfort such as sleep by intensifying normal psychological and hormonal changes during pregnancy (Qiu, Gelaye, Fida, & Williams, 2012). The somatic symptoms in depressed and non-depressed pregnant women may not be discriminating and distinctive because they are present regardless of the depressive state, but are more pronounced when pregnant women become depressed (Kelly, Russo, & Katon, 2001). Similarly, Ruiz-Robledillo, Canário, Dias, Moya-Albiol, and Figueiredo (2015) reported greater disruption to sleep for depressed pregnant women. They suggested that depression could amplify sleep disturbance and result in an increasing number of awakenings at night and more difficulties in falling asleep.

In addition to somatic symptoms, depressed pregnant women are found to experience positive and negative affect differently from those who are not depressed. Giesbrecht, Letourneau, Campbell, and Kaplan (2012) discovered that women with high depressive symptoms showed elevated levels of negative affect across the trimesters. Non-depressed women showed decreased levels of negative affect in the first trimester but that increased in the third trimester. However, women with high levels of depressive symptoms showed the opposite trend. Rodriguez et al. (2001) also reported that psychological symptoms (i.e. negative affect and stress) were the major predictor of depression prevalence. In line with that finding, Manber et al. (2008) concluded that the two core depressive symptoms, sadness and anhedonia, had the greatest effect in distinguishing the depressed from non-depressed pregnant women. The finding supported that psychological symptoms of distress should be recognized as an indicator for screening. However, suicidality and guilt were found to have a lower severity in depressed pregnant participants than in the non-pregnant depressed group (Manber et al., 2008). Consistent with previous studies (e.g. Appleby 1991; Marzuk et al. 1997), the finding provided support for the suggestion that pregnancy may protect women from this symptom.

Depression during pregnancy also has negative impacts on women's social experience or ability to leave their homes. Crucial triggers for depression include social interaction and conflict and people's response to them (Paarlberg et al., 1996). Furber, Garrod, Maloney, Lovell, and McGowan (2009), in their qualitative study, recorded the experience of psychological distress during pregnancy on women's psycho-social experience. Several women expressed their unwillingness to attend normal social activities or leave their homes because they experienced a high level of anxiety. They reported being less able to socialize than before and a disrupted relationship caused by their distress. In particular, they felt that their husbands were not able to understand how depressed they were and it elicited more frustration.

Another question lies in distinguishing between antenatal and postnatal depressive symptoms, arising from DSM's extension of postpartum onset into the pregnancy period. Wisner, Peindl, and Hanusa (1994) failed to identify any differences in terms of symptoms between depression onset during the perinatal period (pregnancy and postpartum) and outside of it. Similarly, Cooper and Murray (1998), Cunningham, Brown, Brooks, and Page (2013) also found that postnatal depression is more similar to general depression than to a distinct category. The severity of somatic symptoms in pregnant depressed women showed insignificant differences during and outside of pregnancy. This is inconsistent with one's prediction that pregnancy deepens somatic symptoms. These findings showed that peripartum depression has a similar clinical presentation of depression as in general depression.

On the other hand, a number of differences exist between pregnancy and the postpartum period in respect of hormone levels, stress, sleep patterns, and immune system functioning (Köninger et al., 2013; Mindell, Cook, & Nikolovski, 2015). A few studies that compared the symptom patterns of antenatal depression with depression in the postpartum period and outside of pregnancy found differences in the symptom pattern (Kammerer et al., 2009). Women with postpartum depression

experienced higher psychomotor retardation than during pregnancy (Kammerer et al., 2009). For example, early insomnia (difficulty in falling asleep) was found significantly lower in the postnatal period than in the antenatal (Whiffen & Gotlib, 1993). A recent study by Altemus et al. (2012) found differences in symptom profiles between major depressive episodes with pregnancy onset and with postpartum onset. Depression with postpartum onset entails an increased chance of experiencing intrusive violent thoughts and other obsessive-compulsive symptoms, as well as psychotic symptoms. Pereira et al. (2015) also found that symptoms such as changes in sleep pattern, loss of interest in sex, feeling overwhelmed, loss of energy, irritability, fatigues, and changes in appetite, crying, indecisiveness, and feeling worthless were at significantly higher levels during the third trimester than in the postpartum period. However, these studies could not rule out natural physiological factors during pregnancy and the postpartum period. Hence, it has been a challenge to draw conclusions about the depressive symptom profile during pregnancy.

Chapter 1.4.2 introduced how culture could influence the expression of depression. Cultural differences in symptom definition and expression have also been observed between Western and non-Western societies during antenatal and postnatal periods (Oates et al., 2004). For example, Asian populations are more likely to express depression in terms of somatic complaints (e.g. Park and Dimigen, 1995). Yoshida, Yamashita, Ueda, and Tashiro (2001) reported that Japanese women tend to express their emotional problems through physical complaints and worries about childcare, rather than depressive moods. Similarly, Chinese women often describe somatic symptoms of depression, such as head numbness, as “wind inside the head,” or “wind illness” (Lee, Yip, Chiu, & Chung, 2000). When Nigerians mention nausea/vomiting and feeling “hot in- the-head”, those may be indications of depression (Jinadu and Daramola, 1990, as cited in Halbreich & Karkun, 2006). Bengali mothers hardly consider the possibility of life being worthless, which is a common screening question in Western research (Watson & Evans, 1986). This pattern provides contradictory evidence to generalizing conceptualizations of depression by Europeans and North Americans.

To date, the development of a body of research on antenatal depression has mainly focused on applying Western constructs of depression to Chinese populations, and on demonstrating the universality of diagnostic descriptions of depressive symptoms across cultures. In China, the socio-cultural context shapes women's experiences of depressive symptoms. There has been little in-depth research into the experience of Chinese women with antenatal depression (Chan, Levy, Chung, & Lee, 2002; Chan, Williamson, & McCutcheon, 2009). Studies on antenatal depressive symptoms have been focused mainly on sum scores of depression (Fried, 2014).

Moreover, studies exploring the qualitative experience of depressed pregnant women such as that of Furber et al. (2009) have not been conducted in China. A qualitative study by Chan et al. (2002) examined how Chinese women in Hong Kong experience postnatal depression. This study can provide some insight into the interpersonal relationships and social context that Chinese pregnant women experience. The study captured four main themes in the experience of Chinese women with postnatal depression. These themes included feeling trapped, ambivalence towards the baby, an uncaring husband, and controlling and powerful in-laws. The central theme remains the feeling of entrapment in which participants felt anxious, confused, tired, sad, worried and angry. Other symptoms included losing control of and feeling hopeless towards the future, seeing violent means such as suicide or homicide as the only way of escape, developing an ambivalent feeling towards the new-born and a feeling of bouncing between love and indifference. The result of this study highlights the role of interpersonal factors when women experience postnatal depression. Evidence of filial piety and the obligation of showing respect and obedience to the senior members of the family emerged in the study. It supported the idea of harmony, interdependence and loyalty in Chinese traditions, as opposed to the Western ideals emphasizing competitiveness, independence and change (Kuo & Kavanagh, 1994). Taking into consideration Chinese tradition and culture, the experience of postpartum depression could vary from that in Western societies. Although women in Hong Kong are under substantial Westernized influences, they still feel obligated to maintain harmony in the family by obeying senior family members, especially their mothers-in-law, and they

feel powerless in a household. In addition, the prominent emotion found in postnatal depressed Chinese women is more interpersonally orientated, as "shame-based" (losing face), that the social consequences of "getting caught" are perceived to be more important than individual feelings (Lau & Wong, 2008).

2.3 Antenatal Depression in China

Classified by the World Bank as a low-middle income country, China is reported to provide relatively insufficient local statistics on mental disorders during pregnancy. When comparing the prevalence of mental disorder of 100 low- and lower-middle-income countries with high-income countries, the meta-analysis conducted by Fisher, Carbel de Mello, Patel et al. (2011) documented a higher average prevalence of mental disorder during the perinatal period (15.9%; CI: 15.0–16.8%) than in high-income countries and highlighted the commonness of mental issues during pregnancy. The meta-analysis included three studies of Chinese postpartum populations, which reported depression prevalence of 17.3% (Xie et al., 2007), 15.5% (Wan et al., 2009) and 13.8% (Guo et al., 2009).

There is a well-established body of research and prevalence of postpartum depression (PPD) which affects 10-20% of Chinese women (Gao, Chan, You, & Li, 2010), however, there has been substantially less attention to antenatal depression in China (Zeng et al., 2015). In Chinese populations, the prevalence rates of antenatal depression range from 4.8% to 49.2%. Qiao and colleagues (2009) recorded a prevalence of antenatal depression of 4.8% in Chinese pregnant women, whereas Zeng and colleagues (2015) recorded a prevalent rate of 28.5% in pregnant women in South China. Lau and Wong (2007) reported that 9.9% of women had severe depressive symptoms at their second trimester in Hong Kong. In fact, Waldie et al. (2015) also reported a greater likelihood for Asians to experience antenatal depressive symptoms. The majority of studies were conducted on the Chinese population living in western societies, in Hong Kong and in Shanghai (Lee et al., 2004), which are more Westernized than more remote and rural cities. As mentioned in Chapter 1, inland areas such as Inner Mongolia are rarely studied. Zhang et al. (2012) carried out a

household survey in 12 districts of the Inner Mongolian Autonomous region to examine the characteristics of birth defects between 2005 and 2008. They reported a relatively higher percentage of birth defects in Inner Mongolia than other parts of China with an ascending trend, suggesting an increasing need for prenatal care and screening. The high prevalence rate of antenatal depression found in China and more birth defects in Inner Mongolia suggest that Chinese women are also vulnerable to antenatal depression. Gao et al. (2010) reported that it is common for Chinese women to feel unprepared for motherhood and to question their competence in carrying out maternal tasks. The feeling of being drained and inadequate can impact on their control over emotions and behaviours. In addition, it is likely that Chinese women under-report their depressive symptoms (Lee et al., 2004). This is also revealed in the lower rates and cut-off values on the Hong Kong and Shanghai Chinese population of EPDS for postnatal depression (Qiu et al., 2001).

In chapter 1 (section 1.4.1) an outline was given of the social, cultural and political environment that Chinese people experience. This included a collectivistic culture, Confucian heritage and the one-child policy. These factors are argued to have an influence on Chinese people's depression expression. On top of these factors, pregnant women in China also experience the traditional values about family and childbearing, as well as employment pressures that impose challenges on their pregnancy. How Chinese women experience pregnancy could develop their culturally sensitive symptoms that vary from conceptualization under a Western construct. For example, China's one-child policy could interplay with the traditional idea of son preference to create a psychological burden for childbearing. These issues will be discussed in section 2.3.1.

2.3.1 Social, cultural and political contexts experienced by Chinese pregnant women

There are a number of reasons to focus on interpersonal factors among pregnancy-related depression in China (section 1.4). Interpersonal relationships and factors

remain important factors in Chinese women's lives. For example, women who highly value their social image are less likely to seek help, resulting in a higher risk of early postnatal depression (Lau & Wong, 2007). Chinese women report that the majority of the stress comes from the family, which is described as a double-edged sword (Kuo & Kavanagh, 1994) that can become a burden even while it provides support. In particular, the dominant role of the mother-in-law roots in traditional Confucian societies (Lim & Lim, 2012). The primary emotional tie between mother and son, instead of husband and wife, often creates a hostile environment for the daughter-in-law, making it appear that she is "stealing" the comfort and emotional support that the son could offer to his mother. Therefore the conflict between daughter-in-law and mother-in-law is common in Confucian societies (Sandel, 2004). In the study by Chan et al. (2002), Chinese women with postnatal depression reported their husband's family as powerful and controlling and that they faced difficulties in acting against their wishes. Even if the women were financially independent and were influenced by the Western concept of assertiveness, they reported difficulties in reality in being assertive and outspoken. The researchers proposed that although appearing 'Westernized', Chinese women reported feeling obligated to obey the senior family members and feeling powerless in fighting back. Similarly, Chen and colleagues (2009) found that Hong Kong women with postnatal depression had a large degree of anger towards their mothers-in-law and husbands. The emotion was absent in Australian depressed women. Moreover, given the traditional value of the male as the breadwinner and women as the caregiver despite both spouses being employed, the dominant and controlling role of the husband in the family could be a cause for women's distress (Chan et al., 2002). The study by Cheung (2002) also revealed the tension between the mother-in-law and the daughter-in-law relationships among Chinese women but not in Scottish women. Niemi et al. (2015) found that pregnant women with a rising score on EPDS reported a problematic relationship between women and their mothers-in-law. In addition, the disagreement between daughter and mother-in-law on gender preference associated significantly with antenatal depression (Senturk Cankorur, Duman, Taylor, & Stewart, 2017). Similar to pregnant women in China, they are in a dilemma between gender equality and women's rights to be employed in the labour market, and the traditional point of view that their mothers-in-

law have for them to sacrifice themselves and devote themselves to their families. In sections 2.3.1.1 and 2.3.1.2, an outline will be given of the social, political and cultural context in China. This provides an insight into how Chinese society could help shape pregnant women's depression expression.

2.3.1.1 Son preference and birth-control policy in China

Son preference is widely prevalent in China because of the Confucianism ideology's emphasis on consistent male lines that penetrates many generations and the production of multiple male siblings (Chi, 1989). It recognizes that failure to have a son is the worst of the three greatest failures in filial responsibility (Hillier, 1988). Although in recent years there is considerable evidence that points to the weakening of son preference in China, Zhou, Wang, Zhou, and Hesketh (2012) conducted in-depth interviews with 212 individuals in rural and urban areas of Yunnan, Guizhou and Zhejiang provinces in China. The study revealed the existence of considerable sex selection in a minority of the sample, though they found a decline in son preference especially in the younger generation. The tendency remained more common in participants' parents. Lin (2009) suggested a possibility that filial piety is still deeply rooted in Chinese society and many couples are under pressure from their parents to produce a son (Lin, 2009). The causal relationship between the gender of the baby and the stress on the mothers is supported in the study by Chan et al. (2002), suggesting that son preference still plays an important role in Chinese societies and in maternal distress. The stresses of son preference mainly comes from the senior family members and husbands, and though not explicitly expressed nowadays, nevertheless wielded hidden pressure on the women (e.g. Leung et al., 2004).

In a qualitative study of Chinese and Scottish women's pregnancy experiences by Cheung (2002), Chinese women reported pregnancy as a fulfilment of a marriage, reflected in their preference for their mothers or mothers-in-law to be present during

labour. The process has a great influence on their self and social image. Most importantly, bringing a son to the family greatly elevates their social status and confidence within the family and community. Chinese women regard pregnancy as a process to produce a compulsory heir to the lineage. Quoting from one of the respondents:

> As a Chinese, we always say to the outsiders that there is no difference of having a girl or a boy, but inside of our hearts we still want to have boys…the position of a woman in society or at home is very much influenced by the sex of that child. In front of her parents-in-law, having a boy, she 'finds her back more straighter than before'.

Although this tendency was also found in various degrees in Scottish women especially among older generations, the study reported a more liberal reaction in Scottish women about having a girl or a boy. In addition, bearing and giving birth to male children did not provide them with the same social status in the family as for Chinese women. Scottish women were more emotionally attached to the child than Chinese women. In fact, most Scottish women in this study expressed their preference for having a girl who would be more sympathetic to her mother and could provide greater support for her parents, in which case the same expectation would be given to a Chinese boy. In the study by Loo et al. (2010), male child preference was found to be associated with prenatal anxiety in pregnant women at 10-20 weeks of gestation in Xiangyun Country, China. On the other hand, Dhillon and MacArthur (2010) failed to support the association between male gender preference among pregnant Asian women (mostly Pakistani, Indian, and Bangladeshi) living in the UK.

Unlike other countries in Asia, China is the only country that restricts the child number per family. For three decades a single child was permitted for each couple (see section 1.4.1). The birth-control policy has been heavily enforced through a system of rewards and penalties, such as financial rewards, fines, confiscation of belongings, and loss of

employment (Hesketh, Lu, & Xing, 2005). The birth-control policy challenges the son preference in China and can create adverse consequences and stress for pregnant women, especially when ultrasonic screening of the foetus for gender detection has been forbidden in hospitals. While there has been no direct study carried out in China, a study by Dhillon and MacArthur (2010) on Asian pregnant women in UK found a significant contribution of male preference by their family to antenatal depression. Vietnam shares a similar value of son preference as China. A preference for sons and a woman's duty to produce a son were spoken about as the cause of depression. This is reported in the study by Niemi et al. (2015), which employed a qualitative method in examining pregnant women's experience of depression symptoms. Male preference is common in Asia, including India (Booth, Verma, & Beri, 1994; Nielsen, Hedegaard, Liljestrand, Thilsted, & Joseph, 1997) and leads to sex-selected abortions of female foetuses (Sharma, Gupta, & Relhan, 2007) not only in India but also in China (Löfstedt, Shusheng, & Johansson, 2004).

Women are encouraged to use contraception and abortion is legal in China. Abortion is also available and expected for women who are carrying their second child without government permission or who are pregnant outside marriage. Induced abortion is a legal and government approved service available upon women's request. It is an initiative together with contraception to achieve population stability through its one-child policy. By the 1970s, abortion became the official 'remedial measure' to achieve population control (Hesketh et al., 2005). A higher abortion rate is indeed found in China than other Asian countries with 7,215,400 estimated abortions occurring each year (Sedgh, Henshaw, Singh, Bankole, & Drescher, 2007). Abortion is a stressful life event with complex biological and psychological components. It signifies losing a future child, motherhood, part of the self and can also put women in doubt of their capabilities to carry another child (Lok & Neugebauer, 2007). The association between abortion and depression has been tested in the studies by Broen, Torbjrn, Bdtker, and Ekeberg (2006) and Cumming et al. (2007). Consequently, both spontaneous (miscarriage) and induced abortion have negative impacts on mental health in a subsequent pregnancy. In the study conducted by Huang et al. (2012), they found a significant impact from a history of induced abortion and adverse mental well-being.

2.3.1.2 Challenges that Chinese women face in work-life balance

Across nations, many women find that their professional role contributes greatly to their personal identity and vital satisfaction (Lacunza & Martinez-Cengotitabengoa, 2015). However this socio-cultural change can result in antagonism between the maternity demand and the labour demand during pregnancy (Gatrell, 2011). A well-accepted belief holds that a women's life is complete only after she gives birth to a child. For many women, maintaining a balance between a professional role and a maternity role is a challenge, especially in work settings. Gatrell (2011) reported that many pregnant women denied their health issues and resisted taking sick leave. Warren and Brewis (2004) and Gatrell (2011) found that pregnant women could be labelled as poor judges, overly emotional, prone to tears, and intellectually less capable. Indeed, Employers perceive pregnancy with revulsion, antipathy and fear (Gatrell, 2011). A systematic review by Bonde (2008) identified that adverse psycho-social factors in the workplace such as high demand and decision latitude, and effort-reward imbalance are associated with depressive symptoms and major depressive episodes.

Chinese women are facing adverse conditions in employment. During Mao's era, women were entitled to lifetime secure employment and a wide range of social service and benefits including maternity leave, childcare, healthcare, and retirement pensions. Following the transformation from a centrally planned to a market economy, the employment situation has been moving in a direction that is unfavourable to women, especially for those who are married. Cooke (2010) compared patterns of women's employment and reward in China, India, Japan and Korea and reported that Chinese women have been disproportionately selected for redundancy. If they are dismissed they are often forced out of formal employment and have to settle for a salary cut and greater job insecurity. The employment rate for women has dropped drastically since the 1990s, especially in the urban areas. In addition, the percentage of women doing paid work dropped between 1990 and 2010 (Attané, 2012). Radical reform of the

Chinese economy which has encouraged marketization and globalization, gives more power to employers counteracting gender equality in employment and has resulted in greater gender discrimination (Cooke, 2010). Women's security in employment is also less protected than men's by the unions. In contrast to the picture of women's employment, a steep rise in the cost of childcare, especially day-care, health, and education, has increased the difficulty of reconciling family and professional life. Children thus become an obstacle for Chinese women's employment.

Women in China are reported to experience sexual discrimination in the labour market, and are unprotected by the gender equality law. Many jobs are reserved for men and women continue to hit the "glass ceiling" (Attané, 2012). A falling percentage of women employed in leadership roles suggest that women are losing the competition with men. This is also supported by less positive and approving attitude of men towards female managers in China (Bowen, Wu, Hwang, & Scherer, 2007). The 2010 Chinese census showed that despite 44.7% of women being in the labour force, only 25.1% of them are in the leading role. In 2010, 10% of women reported being or having been victims of discrimination in the workplace, compared with 4.5% of men. Among those who were sacked, 70% of women reported being dismissed unfairly following marriage or pregnancy (ACWF, 2010). The adverse situation puts women into financial insecurity. One in five women reported being financially dependent on a member of her family (Population Census Office and National Bureau of Statistics of China, 2012).

Yet family dynamics and family support are possibly more important mediators in antenatal depression in China and other East Asian countries than for women's Western counterparts (Schatz, Hsiao, & Liu, 2012). Chinese women experience conflict arising from the Confucian values of female obedience and other gender norms, and the socialist ideology of 'women holding up half the sky'. Pregnant women are under constant pressure from the son-preference tradition and the birth-control policy which impact significantly on their lives and pregnancy experience. Previous studies conducted among Hong Kong women in antenatal and postnatal periods also

identified stress relevant to cultural and social norms (Lau & Keung, 2007). In Chinese societies, harmonious, interdependent interpersonal and family relationships are valued and emphasized as the path towards joy, a peaceful mind and psychosocial equilibrium (Lu & Gilmour, 2004). Traditional Chinese culture puts great emphasis on filial piety. Contemporary Chinese society remains strongly adhered to the traditional value (Whyte, 2005), which expects women to be good at carrying out domestic duties and at ensuring that their children behave well (Zuo & Bian, 2001).

However, Cooke (2010) postulated that compared to women in Japan, Korea, and India, women in urban Chinese families largely fall within the 'dual earner/state carer', 'dual earner/dual carer', and 'dual earner/marketized female carer' models. Despite these work-life changes, great expectations surround the wife's responsibility for carrying out domestic tasks (Zuo & Bian, 2001). Indeed, family-work conflict has been shown to relate to depression in various Chinese populations, such as female nurses (Hao, Wu, Liu, Li, & Wu, 2015; Wang, Chang, Fu, & Wang, 2012), doctors (Wang, Liu, Wang, & Wang, 2012), and bank employees (Kan & Yu, 2016). Interpersonal stress can play a more important role during pregnancy and the postnatal period of Chinese women's lives. In support of this, Taiwanese women with postnatal depression reported fatigue in adjusting themselves in interpersonal interactions, whereas women in the U.S. emphasized symptoms related to loss of control (Chen, Wang, Chung, Tseng, & Chou, 2006). To date, no study has considered family-work conflict among Chinese pregnant women as a risk factor for depression. This will be an important aspect of the third study presented in this thesis (see chapter 6).

2.4 Chapter summary

This chapter discussed the literature on physical and psychological transitions during pregnancy and when it goes wrong. Specifically, pregnant women are vulnerable to interpersonal stressors. Chinese pregnant women are argued to be particularly affected by the traditional requirement to bear a son, while they are under great influence from the one-child policy, which could intensify their stress, especially when sex determination before childbirth is forbidden in China in order to avoid sex-selection abortion. In the context of the one-child policy, pregnant women can face excessive attention from in-laws and their own parents. In a household that emphasizes the harmonious relationship between the wife and her mother-in-law, Chinese pregnant women face more complicated interpersonal stress than Western women. However, antenatal depression is less studied and the symptom profile is unclear. One challenge is the lack of suitable measurement tools. The next chapter will therefore discuss the current self-report instruments used in Western society and in China.

CHAPTER THREE

AN INTRODUCTION TO SELF-REPORT DEPRESSION INSTRUMENTS FOR ANTENATAL DEPRESSION

3.1 Introduction

Chapter 1 and 2 outlined a picture of depression in general populations and pregnant women. In particular, the two chapters introduced how cultural, social and political environments in China could influence depressive symptom expression in Chinese people. This chapter presents a review on self-report questionnaires that have been developed and validated on pregnant women. The first section (3.1) gives a brief account of using self-report questionnaires in practice and in research. It also explains the searching algorithm used to locate all the self-report measures that have been validated during pregnancy. Section 3.2 provides a brief introduction to 5 major self-report questionnaires widely used in practice and research with antenatal depression. An overall reflection is presented in 3.3. The connected sections then lead to the rational of this review chapter and later empirical studies.

3.1.1 Using self-report questionnaires in depression screening

Postnatal depression (PND) has been receiving more clinical and research attention than antenatal depression (Lee, Yip, Leung, & Chung, 2004; Stewart, Umar, Tomenson, & Creed, 2013a). Routine or universal screening for postnatal depression (PND) is recommended together with clear guidelines and legislation. For example, in the US states such as Illinois and New Jersey, and in Australia, routine screening for PND has been made a policy (Austin, Middleton, Reilly, & Highet, 2013; Illinois Chapter -American Academy of Pediatrics, 2008; University of Minnesota, 2012), and can be carried out as early as 24–48 hours postpartum when the women are still in hospital after delivery (Austin et al., 2013). The study by Avalos, Raine-Bennett, Chen,

Adams, and Flanagan (2016) documented that universal screening on perinatal depression using the PHQ-9 led to increased detection and treatment among depressed women in North California, though it has yet to be implemented around the world. In contrast, antenatal consultations with midwives, family doctors, and obstetricians focus mainly on somatic/obstetric parameters, and inadequate attention may be given to mental health and psychological wellbeing (Mulder et al., 2002). In Inner Mongolia, routine screening of antenatal depression has been neither implemented nor recommended. In addition, no information on antenatal depression or psychological issues could be found on the websites of antenatal hospitals in Inner Mongolia.

Section (2.2) provided a brief introduction on the latest policy on antenatal screening. This is because screening for depression during pregnancy has been supported as effective and marginally cost-effective (Venkatash et al., 2016). Self-report rating scales with a limited collection of symptoms provide a cost-effective screening method for depression (Bjelland et al., 2002) and routine use has been recommended and implemented in some countries (Buist et al., 2006). Screening at an early stage (e.g. at first antenatal check-up) can provide some insights into the prevalence and risk of depression and anxiety, whereas screening towards the end of pregnancy (e.g. 34–36 weeks of gestation) may help to predict postnatal depression (Faisal-Cury & Menezes, 2012). Accurate screening helps to identify higher risk pregnant women who may require full diagnostic assessment for depression (Milgrom & Gemmill, 2014). However, agreement has not been reached on which measurement scale is most appropriate (Flynn, Sexton, Ratliff, Porter, & Zivin, 2011) for use as a screening tool to assess current emotional state during pregnancy (Milgrom & Gemmill, 2014).

Given the effectiveness of self-report instruments in screening for antenatal depression, it raises the issue of the content validity of scales used across cultures. As mentioned in Chapter 1 (section 1.3.3), cultural influences on the expression of symptoms of depression remain an important issue in cross-cultural research on depression (Bina, 2008). People from different cultures may have different perceptions of psychological

and social stressors (Bernazzani et al., 2004). Culture affects how depression is conceptualized (Marsella, 1980). The importance of developing culturally sensitive measurement tools has been recognized by many researchers (e.g. Canino, Lewis-Fernández, & Bravo, 1997). The etic approach aims to identify and compare similar phenomena across different cultural contexts (Bravo, 2003). It generates a number of self-report and observant-rating scales that are based on the clinical observation of patients in Western cultures. These scales contain items that are empirically driven (Chang, 1985). Using them as standards to identify cases of depression in non-Western cultures (Bravo, 2003) has been criticized for "category fallacy" (Kleinman, 1988). Validation of self-report instruments across cultures has emphasized reliability at the cost of validity (Alegria et al., 2004). A sense of homogeneity across different cultural contexts may emerge at the expense of a constricted conceptualization embedded in the instrumentation (Bravo, 2003). Ghubash and Abousaleh (1997) postulated that the standardized Western screening tools, such as the EPDS and the diagnostic classification systems, might be culturally insensitive (Halbreich & Karkun, 2006). They can perform differently in terms of psychometric characteristics across cultures (Affonso, De, Horowitz, & Mayberry, 2000), resulting in an elevated risk of missed symptoms or signs in non-Western cultures. In particular, a wide adoption and implementation of the EPDS (Gibson et al., 2009), has resulted in insufficient studies of other assessments scales for antenatal depression and less emphasis on developing new scales, despite the shortcomings of the EPDS.

3.1.2 Investigations of depressive symptom profiles during pregnancy using self-report questionnaires

As mentioned in chapter 1 (section 1.2.2), depression has been shown to be a heterogeneous disorder in terms of symptomatology. Different combinations of symptoms can give rise to over a thousand symptom profiles, all meeting DSM-IV diagnostic criteria (Ø stergaard et al., 2011). Research on depression has been focusing more heavily on symptom sum-scores rather than on individual symptom characteristics (Fried, 2014). Fewer studies focused on the symptom profile of

depression during pregnancy. Research on antenatal depression has also been in paucity in China when compared to postnatal depression (Zhou, Liao, Liu, & Qang, 2012). As a result, insufficient evidence on the symptom profile of depression during pregnancy could cast doubts regarding the adequacy of scales for general depression to be used in the antenatal period (Matthey & Ross-Hamid, 2012).

A number of studies have investigated the symptom profiles using factor analysis (Kessler et al., 1996). This method is restricted to the instruments that could be used for factor analysis. An instrument with few items is less able to capture the full dimension of the depression symptom profile in a cultural group. Despite the important role that interpersonal factors may play in depressive symptoms in the Chinese population (see Section 1.4) and Chinese pregnant women (see Section 2.3.1), the factor structure of antenatal depression in Chinese pregnant women has not been fully established and this could hinder screening and assessment. Previous studies carried out using self-rating instruments generated little knowledge about the expression of interpersonal difficulties in symptom profiles. This is because commonly used self-rating scales do not contain interpersonal symptoms. A few studies that have been reviewed in Chapter 1 (Section 1.4.6) examined cultural characteristics of depressive symptoms in the Chinese population, such as using metaphorical language and the presentation of psychological distress as interpersonal problems. Chinese pregnant women would likely show similar cultural characteristics in their depressive symptom profiles. Later empirical chapters (chapter 4, 5, 6), present studies to explore assessment tools that may be useful with an Inner Mongolia clinical and pregnant sample. They also look at the factor structure for clinical and pregnant samples using factor analysis. This chapter presents a review on the 13 self-report depression assessment scales that have been validated on pregnant samples in the West and in China. The purpose of this chapter therefore is to establish the groundwork that leads to a better understanding of the rationale for the empirical studies. The following sections (3.2.1-3.2.14) provide a close examination into individual self-rating scales, highlighting their strengths and weaknesses. This will help readers to understand why

some scales are chosen in the empirical studies for examining the symptom profiles of Chinese clinically depressed patients and pregnant women.

3.2 Commonly used self-report scales during pregnancy

An in-depth search for the self-report questionnaires that have been validated on pregnant populations identified 13 self-report questionnaires. The search strategy was as follows. All databases accessible through the University of Edinburgh, including three major ones, MEDLINE, PsyINFO, EMED, with no restriction on date, were searched with combinations of keywords "antenatal", "prenatal", "pregnant", "pregnancy", "perinatal", "trimester", "childbearing", "gestation", "screening", "assess", "measure", "tool", "instruments", "validate", "validation", "psychometric", "scale", "factor structure", "factor analysis", " psychometric", "depressive", "depression", "mood", "distress". Abstracts of articles that resulted from the search were read to help identify relevant articles. The inclusion criteria involved studies that examined the psychometric properties of any depression assessment scale with pregnant women in any trimester in any year of publication. Excluded studies involved those who directly applied the scales to examine the prevalence and risk factors of antenatal depression. Although a large number of self-report depression assessment scales have been developed, only a limited number of instruments have been validated during pregnancy. After the self-report instruments were identified, each was searched individually to locate validation papers on a pregnant sample. The search included papers that contained the full name of the self-report scales in their titles with a combination of the keywords "antenatal", "prenatal", "pregnant", "pregnancy", "perinatal", "trimester", "childbearing", "gestation".

As a result, 13 scales were identified using the searching algorithm above, including: the Beck Depression Inventory (BDI) (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961), the Edinburgh Postnatal Depression Scale (EPDS) (Bennett et al., 2004; Cox,

Holden, & Sagovsky, 1987), Centre for Epidemiologic Studies Depression Scale (CES-D) (Radloff, 1977), General Health Questionnaire (GHQ) (Goldberg & Williams, 1988), Hospital Anxiety and Depression Scale-Depression Subscale (HAS-D) Zigmond and Snaith (1983), The Kessler Psychological Distress Scale (K-10) (Kessler et al., 2002), The Pregnancy Depression Scale (PDS) (Altshuler et al., 2008), The Postpartum Depression Screening Scale (PDSS) (Beck & Gable, 2000), Patient Health Questionnaire (PHQ) (Kroenke, Spitzer, & Williams (2001), Zung Self-rating Depression Scale (SDS) (Zung, 1965), How I feel Scale (Goldenberg et al., 1997), Aga Khan University Anxiety and Depression Scale, and The Inventory of Depressive Symptomatology, self-report versions (IDS-SR) (Rush, Gullion, Basco, Jarrett, & Trivedi, 1996). All of these measures were primarily designed to assess major depression in general populations or during the postpartum period. They have been translated and applied to different populations and ethnic groups. Table 3.1 shows a summary of validation studies for the 13 scales identified. To date, the majority of studies on antenatal depression in Chinese populations have used translations and adapted versions of self-rating scales developed in Western cultures (Wong et al., 2012). Not all of them are validated on a pregnant Chinese population before using the summary scores of the scales validated on a general depressed population.

Table 3.1 Summary of the psychometric properties of screening tools during pregnancy

Scale	Author(s) and year	Sample size	Prevalence and stage of pregnancy (if specified in studies)	Factors Analysis conducted (if any)	Diagnostic interview (if any)
EPDS	Adewuya, Ola, Dad, & Fasoto, (2006)	182	10.5%, 32-36 weeks	No factor analysis conducted	MINI
	Adouard, Glangeaud-Freudenthal, & Glolse, (2005)	60	25%	2 (depression, depression and other disorders)	Standardised psychiatric interview

Scale	Author(s) and year	Sample size	Prevalence and stage of pregnancy (if specified in studies)	Factors Analysis conducted (if any)	Diagnostic interview (if any)
	Brouwers, van Barr, & Pop (2001)	197	/	3 (depression, anxiety, self-harm)	/
	Bunevicius, Kusminskas, Pop, Pedersen, & Bunevicius, (2009)	230	5%, 3% and 3% at 1st, 2nd and 3rd trimesters	No factor analysis conducted	Structured Clinical Interview for DSM-III-R (SCID-NP)
	Felice, Saliba, Grech, & Cox (2006)	239	14.3%, 18 weeks	No factor analysis conducted	Clinical Interview Schedule (CIS-R)
	Jomeen & Martin (2005a)	101	29% scored above EPDS cut-off 9/10 15% scored above EPDS cut-off 12/13	2	/
	Jomeen & Martin (2007)	117	22% scored above EPDS cut-off 9/10	3	/
	Su et al. (2007)	185	12.0% 2nd trimester 12.9% 3rd trimester	No factor analysis conducted	MINI
	Swalm, Brooks, Doherty, Nathan, & Jacques (2010)	4706	10% scored 12-30 on EPDS, median 26weeks of gestation	2 (depression and anxiety)	NA
	Mauri et al., (2010)	81	32/81 were diagnosed by DSM IV 49/81 scored ≥ 13 3nd month of pregnancy	No factor analysis conducted	Structured Clinical Interview for DSM IV Axis I Diagnosis

Scale	Author(s) and year	Sample size	Prevalence and stage of pregnancy (if specified in studies)	Factors Analysis conducted (if any)	Diagnostic interview (if any)
	Agampodi, Agampodi, & Coyne (2013)	376	16.2% score above 9 on EPDS, 24-36 weeks	2	/
	Bergink et al. (2011)	845	3.69% at 1st trimester, 4.9% at 2nd trimester, 6.5% at 3rd trimester	No factor analysis conducted	CIDI (depression module)
	Stewart, Umar, Tomenson, & Creed (2013b)	224	25.5%, 24 and 36 weeks of gestation	No factor analysis conducted	Structured Clinical Interview for DSM-IV (SCID)
	Toreki et al., 2013)	219	9.1%, 12 weeks of gestation	No factor analysis conducted	Structured Clinical Interview for DSM-IV (SCID)
	Odalovic et al., (2015)	201	27.6% score ≥13	3	/
	Kwan et al., (2014)	920	/	1	/
EPDS, K10	Fernandes et al. (2011)	194	14.4% at 3rd trimester	No factor analysis conducted	MINI-PLUS version 5.0.0
EPDS, PHQ-9	Flynn et al. (2011)	81	72%, mean 23.2 weeks of gestation	No factor analysis conducted	unstructured clinical interview using DSM-IV
EPDS, PDSS	Zhao et al. (2015)	842	9.6% EPDS≥13 or PDSS≥ , Various gestation weeks	No factor analysis conducted	/
BDI-II	Alexander, Rodriguez, Munoz,	217	/	2-factor (cognitive affective, somatic) and 3-	/

Scale	Author(s) and year	Sample size	Prevalence and stage of pregnancy (if specified in studies)	Factors Analysis conducted (if any)	Diagnostic interview (if any)
	Perry, & Le (2014)			factor (cognitive-affective, somatic, pregnancy symptoms)	
	Husain et al. (2014)	714	36.6 % scored ≥ 12 on BDI-II	No factor analysis conducted	Schedule for Clinical Assessment in Neuropsychiatry
CES-D EPDS	Mosack & Shore (2006)	98	31.6% scored 16 or above on CES-D 14.3% scored 12 or above on EPDS	No factor analysis conducted	NA
GHQ-30	Sharp, (1988)	179	35% scored GHQ-30 (≥6) 29% case positive at interview, 1st trimester	/	Standardized psychiatric interview
GHQ-28	Prady et al., (2013)	5089	/	Underlying factors vary across ethnic groups	/
	Aderibigbe & Gureje (1992)	106	4.9%, 2nd trimester	No factor analysis conducted	Diagnostic interview DSM-III
	Swallow, Lindow, Masson, & Hay (2003)	273	44.3% of the women scored ≥ 5; 39.6% scored ≥ 24, 1st trimester	No factor analysis conducted	/
GHQ-12	Ip & Martin (2006)	292	66% scored above GHQ-12	2 and 3	/

Scale	Author(s) and year	Sample size	Prevalence and stage of pregnancy (if specified in studies)	Factors Analysis conducted (if any)	Diagnostic interview (if any)
			cut-off 11/12		
	Martin & Jomeen (2003)	59	34.5% scored above GHQ cut-off; over 37 weeks gestation	No factor analysis conducted	/
HADS-D	Jomeen & Martin (2004)	101	12% scored above HADS-D cut-off 7/8 3% scored above HADS-D cut-off 11/12	3	/
	Karimova & Martin (2003)	100	16% of UK sample and 20% of Uzbek at 12 weeks 36% of UK sample and 16% of Uzbek sample at 34 weeks	2, 3, 4 5 factors extracted	NA
PDSS	Pereira et al. (2010)	503	1.3%	No factor analysis conducted	DIGS; OPCRIT

Scale	Author(s) and year	Sample size	Prevalence and stage of pregnancy (if specified in studies)	Factors Analysis conducted (if any)	Diagnostic interview (if any)
PDS	Altshuler et al. (2008)	196	20.5% (1st trimester), 29.4% (2nd trimester), 18.2% (3rd trimester)	No factor analysis conducted	SCID-I/P
PHQ-9, PHQ-2	Arroll et al. (2010)	2642	6.2%	No factor analysis conducted	CIDI
PHQ-8, PHQ-2	Smith et al. (2010)	213	4.97% 1.6%	No factor analysis conducted	CIDI
PHQ-9	Zhong, Gelaye, Fann, Sanchez, & Williams (2014)	1520	/	unidimensional	structured interview
	Barthel, Barkmann, Ehrhardt, Schoppen, & Bindt (2015)	639 (CDI) 389 (Ghana)	32.9% in Côte d'Ivoire 26.6% in Ghana; 3nd trimester	unidimensional	/
	Sidebottom et al. (2012)	745	3.6 %	/	Structured Clinical Interview for DSM-IV (SCID)
SDS	Sugawara et al. (1999)	197	/	3	SADS
SDS and GHQ-30	Kitamura, Shima, Sugawara, & Toda (1994)	120	15.7% Early and late pregnancy	No factor analysis conducted	Yoruba version of the Psychiatric Assessment Schedule (PAS) according to the DSM-IIIR
	Bos et al. (2009)	331	1.5% and 3.3%	2 and 3	DIGS

Scale	Author(s) and year	Sample size	Prevalence and stage of pregnancy (if specified in studies)	Factors Analysis conducted (if any)	Diagnostic interview (if any)
AKUADS	Karmaliani et al. (2007)	997	11.5% scored above AKUADS cut-off 31.5	2	NA
IDS-SR	Brunoni et al. (2013)	543	11%.	2 (mood/cognition, irritability/anxiety /pain)	Diagnosed by trained psychologists

*CIDI (World Mental Health Composite International Diagnostic Interview); DIGS (Diagnostic Interview for Genetic Studies); CIS-R (The Clinical Interview Schedule-Revised); DSM-IV (Diagnostic and Statistical Manual of Mental Disorder-Fourth Version); MINI (Mini-International Neuropsychiatric Interview); OPCRIT (Operational Criteria Checklist for Psychotic Illness); PESI (The Perinatal Emotional States Interview); SADS (*Schedule for Affective Disorders and Schizophrenia); SADS-C (Schedule for Affective Disorders and Schizophrenia-Changed Version); *SCID-1/NP (Structured Clinical Interview for DSM Disorders-Non-Patient Version); SCID-1/P (Structured Clinical Interview for DSM Disorders-Patient Version).*

In the following section, the five most widely used scale-report questionnaires of the 13 identified scales are discussed in more detail. They include: Edinburgh Postnatal Depression Scale (EPDS), Centre for Epidemiological Studies Depression Scale (CES-D), Beck Depression Inventory (BDI), The Pregnancy Depression Scale (PDS), The Postpartum Depression Screening Scale (PDSS), and The Multidimensional Depression Assessment Scale (MDAS). An introduction is given on their development, symptom content and psychometric characteristics including reliability, validity and factor structure in previous validation studies carried out during the antenatal period in Western and Chinese populations. These scales were chosen based on their popularity and relevance in content to pregnancy and postpartum period. First, scales such as the BDI, EPDS, and CES-D were validated in larger numbers of validation studies compared with the other self-report questionnaires such as the "How I feel" scale. For example, the Beck Depression Inventory (BDI) (Beck et al., 1961) and the Edinburgh Postnatal Depression Scale (EPDS) (Bennett et al., 2004; Cox et al., 1987) are the most frequently used scales in the assessment of antenatal depression

(Breedlove & Fryzelka, 2011; Matthey & Ross-Hamid, 2012; Rochat, Tomlinson, Bärnighausen, Newell, & Stein, 2011). They are also the most widely used scales in antenatal research in China (Guo et al., 2009). Second, the EPDS, PDSS, and PDS were developed for postnatal depression so they are more relevant to antenatal depression than scales developed for general depression. An in-depth review of these scales could generate a better idea of screening for antenatal depression using self-report measures. Finally, the MDAS has its unique characteristics distinctive from the rest of the scales and is used in empirical chapters so an in-depth description is provided in this chapter. (Please note that an overview of the scales that are not discussed in detail in this chapter can be found in Appendix D.) In a later section (section 3.3), cultural adaptation of scales and the study of symptom profiles will be discussed.

3.2.1 Edinburgh Postnatal Depression Scale (EPDS)

The Edinburgh Postnatal Depression Scale (EPDS) is a ten-item self-rating scale developed by Cox and colleagues in 1987. It was originally developed to assess depressive severity during the postpartum period. It is built on the Irritability, Depression and Anxiety Scale (Snaith, Constantopoulos, Jardine, & McGuffin, 1978), the Hospital Anxiety and Depression Scale (Zigmond & Snaith, 1983) and some originally created items (Cox et al., 1987). Common somatic symptoms that often overlap with pregnancy consequences such as changes in appetite, energy levels, and sleeping patterns were taken out of the scale in order to prevent over-diagnosis of perinatal depression (Yawn et al., 2009). When used outside of the postnatal period, it is sometimes referred to as EDS (Bergink et al., 2011).

The EPDS is one of the most widely used self-rating scales during pregnancy (Bennett et al., 2004). It has been translated and validated in various English-speaking countries such as England (Evans, Heron, Francomb, Oke, & Golding, 2001), Australia

(Matthey, 2004), and also non-English speaking countries, such as France (Guedeney & Fermanian, 1998), Italy (Benvenuti, Ferrara, Niccolai, Valoriani, & Cox, 1999), Taiwan (Teng et al., 2005), Sweden (Rubertsson, Brjesson, Berglund, Josefsson, & Sydsj, 2011), Mexico (Alvarado-Esquivel, Sifuentes-Alvarez, & Salas-Martinez, 2014), and Chile (Alvarado, Jadresic, Guajardo, & Rojas, 2015). In the most recent review of the psychometric properties of the EPDS by Kozinszky and Dudas (2015), 11 validation studies were retrieved to provide evidence that the EPDS is a valid screening instrument for antenatal depression. The validation studies give rise to 70% to 100% of sensitivity for major depression, and 74% to 97% of specificity and a varied cut-off value ranging from 5.5 to 14.5.

In the Chinese population, the EPDS is also the most validated and most widely applied scale (Guo, 2009; Xia, 2006). Early in 1998, Lee and colleagues validated the Chinese version in Hong Kong. Lee et al. (1998) and Wang et al. (2009) also found good psychometric properties in Mainland China where a Cronbach's alpha of 0.79 was found. Guttman's split-half co-efficient was 0.76 and test–retest reliability was 0.85. Guo (2007) validated EPDS on 732 Chengdu women at 3-14 days postpartum. This study reported a Cronbach's alpha of 0.76 and Spearman's co-efficient ranged from 0.37-0.67. The study also reported a correlation between the EPDS and the BDI at 0.58 ($p<0.001$). Guo, Wang, and Chen (2009) reported an optimal cut-off value of the EPDS as 9.5 in second and third trimester women in Chengdu, giving rise to sensitivity and specificity of 0.79 and 0.83 respectively. The Chinese version of the EPDS was shown to have satisfactory concurrent validity with the Beck Depression Inventory (BDI) and the General Health Questionnaire (GHQ) score (Lee et al., 1998). In addition, the Chinese version of the EPDS also showed a moderate correlation with the General Health Questionnaire (GHQ) (Spearman correlation = 0.50, $p<.001$) and the BDI (Spearman correlation = 0.73, $p<.001$). The Cronbach's alpha of the Chinese version of the EPDS was 0.81 to 0.87, suggesting that it has good internal consistency for a Chinese population.

Various cut-off scores have been suggested for the EPDS for pregnant samples. For example, Bergink et al. (2011) validated the EPDS with pregnant women and reported a cut-off value of 10 in the second and third trimesters, which gave rise to the most adequate combination of sensitivity, specificity, and positive predictive value. Similarly, a cut-off value of 11.5 was suggested among French high-risk pregnant women (Adouard et al., 2005), and 13.5 among Maltese pregnant women (Felice et al., 2006). Murray and Carothers (1990) provided a threshold value of 10.5 on the EPDS to correctly identify 90% of mothers with major depression. A cut-off value of 9/10 was recommended as desirable for the Chinese postnatal population, which gives rise to 82% sensitivity, 86% specificity, 44% positive predictive value, and 97% negative predictive value (Lee et al., 2000). For Mainland Chinese pregnant women in Chengdu, a much lower cut-off value of 9.5 is recommended for signifying depression (Wang et al., 2009). Lee et al. (1998) recommended a cut-off value of 9/10 for pregnant women in Hong Kong. Similarly, the Department of Health of Western Australia released a guideline of using EPDS as a screening tool. It reviewed 5 studies of the Chinese translation of the EPDS of which four identified a cut-off value of 9/10. It therefore pointed to a cut-off value for the Chinese EPDS as 9/10. In summary, a cut-off value of 9/10 for pregnant women should be adopted to avoid high rates of false negatives. This cut-off value was also used in empirical studies as described in chapters 4, 5, and 6.

However, the EPDS has been subject to criticism in terms of its psychometric characteristics. For example, there is insufficient evidence to compare the EPDS with other measures to identify depression (Hill, 2010; Yawn et al., 2009). In the existing evidence, for example, Zhao et al. (2015) compared the EPDS and PDSS and recommend using both scales in screening, but they recognized the PDSS as a more accurate screening tool than the EPDS. The PDSS is also reported to capture women's feelings more comprehensively than the EPDS (White, 2008). Both scales, however, are liable to produce false positive or false negative results (Zhao et al., 2015). Furthermore, in the study by Mosack and Shore (2006), the sensitivity of the EPDS in detecting antenatal depression was lower than that of the CES-D, which classified

more cases of prenatal depression than did the EPDS. The study found that EPDS did not identify any prenatal depression among participants, nor did it identify any woman as being depressed during the early postpartum period. This limited its utility to postpartum depression screening only. Indeed, the EPDS excludes most somatic symptoms, which it considers to be a consequence of pregnancy. However, the remaining items resemble general depression, thus losing its uniqueness for the pregnancy period. As reviewed in section 2.2.2, recent studies on depressive symptoms during pregnancy have prompted us to rethink the role of somatic symptoms during depression, a shift that has not been reflected in the symptom content of the EPDS (Ruiz-Robledillo et al., 2015). In addition, there are concerns over the cross-cultural validity of the EPDS. A systematic review by Gibson, McKenzie-McHarg, Shakespear, Price, and Gray (2009) suggested that the EPDS might be more sensitive when administered in the English language and for women who are more familiar with reporting symptoms in English. However, the heterogeneity in the studies makes it difficult to draw conclusions about its psychometric properties for assessing antenatal depression.

3.2.2 Centre for Epidemiological Studies Depression Scale (CES-D)

The CES-D (Radloff, 1977) is a 20-item self-report questionnaire. It assesses the presence and intensity of common depressive symptoms such as depressed mood, guilt, feelings of worthlessness, psychomotor retardation, loss of appetite, and sleep disturbance in a two-week period. Respondents rate the frequency of each item on a scale of 0-3. Four items are positively worded and reverse scored. Summing the score of each item gives rise to a total score between 0-60. The CES-D has been validated on pregnant women in northern Uganda and is reported to have a Cronbach's alpha of 0.92. A cut-off value of 17 gave rise to high sensitivity and specificity (72.7%, 78.5% respectively) (Natamba et al., 2014).

Previous studies have validated the CES-D on Chinese populations including children (Li, Chung, & Ho, 2010), primary care patients (Chin, Choi, Chan, & Wong, 2015), the elderly (Chen & Mui, 2014), dementia (Cheng & Chan, 2008), suicide attempters and rural residents (Yang, Jia, & Qin, 2015; Zhang, Sun, Kong, & Wang, 2012), and Chinese Americans (Ying, 1988) . However, it has never been validated with pregnant women in China. Zhang and colleagues (2012) reported a 3-factor structure (positive affect, interpersonal problems, depressive mood and somatic symptoms combined) in a rural general population. The study highlighted the "somatization" process in depression expression and the findings provided support for the cultural characteristics of depression (Kleinman, 1977, 1986). A comparison between the CES-D and the EPDS by Mosack and Shore (2006) pointed to a higher accuracy of the CES-D than the EPDS. The CES-D has been used in varies cross-cultural studies of depressive symptoms (Ying et al., 2000). However, more studies are needed for the future usage of the scale on Chinese populations. Hence, the CES-D will not be chosen for the empirical studies in chapter 4, 5, 6 due to a lack of evidence in validation studies among the Chinese pregnant population. In particular, it does not have a valid cut-off value developed to distinguish between depressed and non-depressed pregnant women in China.

3.2.3 Beck Depression Inventory (BDI)

The Beck Depression Inventory (BDI) (Beck et al., 1961) and later revisions are among the most widely used self-report questionnaires in empirical research and clinical settings (Brantley, Dutton, & Wood, 2004). The BDI is a 21-item self-rating scale developed for the assessment of depression in the psychiatric population. Respondents rate each item on a four-point scale with increasing intensity. The BDI has been validated among different populations and translated into various languages, including Chinese. Salamero et al. (1994) reported a Cronbach's alpha of 0.85. Holcomb Jr, Stone, Lustman, Gavard, and Mostello (1996) reported an area under the receiver operating characteristic curve (ROC) of 0.99. A cut-off value greater than 16

gave rise to high sensitivity (0.83) and specificity (0.89). A two-factor model was found in a pregnant sample, including a dominating cognitive-emotional factor and a somatic and inhibition factor. Evidence for both two and three factors solutions has been found for the second edition of Beck Depression Inventory (BDI-II) when used with pregnant women (Alexander et al., 2014; Bos et al., 2009). Both structures supported a robust Cognitive-Affective dimension with residual somatic, or somatic and pregnancy symptom factors (Alexander et al., 2014).

The original BDI has been revised since its development. In Asia, the more widely used second version of BDI (BDI-II) has been validated in general populations in Mainland China but not specifically in pregnant women. Su et al. (2007) investigated the optimal cut-off value of EPDS-T and BDI-II on 185 pregnant Taiwanese women in their second and third trimesters. They provided 12/13 as the optimal cut-off value of the EPDS-T and 11/12 as the optimal cut-off value of the BDI-II. Both gave rise to high sensitivity and specificity (83% and 89% vs. 74% and 83%, respectively). This study also provided evidence for a higher validity of EPDS-T than BDI-II. Insufficient evidence is present for the validation of BDI on a pregnant sample in China, drawing a less convincing conclusion for the psychometric properties of BDI on a pregnant population. Despite the wide validation and implementation of BDI-II, it has also been reported to perform poorly in some validation studies, such as a low sensitivity in detecting minor depression in the postnatal period (O'Hara, Neunaber, & Zekoski, 1984) and a moderate correlation between the BDI-II and other instruments specific for postnatal depression such as the PDSS. Regarding the items, it contains a full scale of somatic symptoms that could lead to a false positive, impacting on the screening accuracy (Whiffen, 1988). However, the BDI is one of the most studied assessment scales. Together with recent research findings on somatic symptoms of antenatal depression (review in chapter 2 section 2.2.2), the BDI will be useful in later empirical studies (Chapter 4 and 5) in this thesis research due to validate other scales during pregnancy.

3.2.4 The Pregnancy Depression Scale (PDS)

The Pregnancy Depression Scale (PDS) is a 7-item, self-rating scale developed by Altshuler et al. (2008). It was derived from the 28-item Hamilton Depression Rating Scale (HDRS) (Hamilton, 1960), and compared against the Structured Clinical Interview for DSM-IV diagnosis (SCID-I/P). The seven items include feeling depressed, feelings of guilt, work and activities, psychomotor retardation, diurnal variation, fatigue, and social withdrawal. Respondents rate on a five-point Likert scale with increasing severity and frequency. In a sample of 201 pregnant women with a history of depression, the PDS was found to have a Cronbach's alpha of 0.81 and a consistent predictive validity across trimesters. Altshuler et al. (2008) also reported the item-total correlation to range from 0.41 to 0.78, and the item-item correlation to range from 0.19 to 0.59. A cut-off value of 16 results in 91% of people meeting diagnostic criteria for major depression. However, the PDS has not been validated in Chinese general and pregnant populations. Due to a lack of evidence on its psychometric characteristics, PDS will thus not be included in later empirical studies.

3.2.5 The Postpartum Depression Screening Scale (PDSS)

The Postpartum Depression Screening Scale (PDSS) (Beck & Gable, 2000) is a 35-item self-report instrument. It was originally developed to screen for postpartum depression (PPD). The dimensions and items were constructed based on qualitative studies about women's subjective experiences of PPD (Beck, 1992). A separate score is assigned to each symptom area (five items each): Sleeping/Eating Disturbances, Anxiety/Insecurity (ANX), Emotional Lability, Mental Confusion (MNT), Loss of Self (LOS), Guilt/Shame (GLT) and Suicidal Thoughts (SUI). Women rate each item on a Likert scale from 1 (strongly disagree) to 5 (strongly agree) based on how they felt during the previous two weeks. The total score ranges from 35 to 175 points (Beck & Gable 2000). Higher scores indicate higher levels of PPD symptomatology, putting women at higher risk of depression. They could thus be referred for additional

diagnostic assessment. The PDSS has been shown to accurately screen postpartum depression (Beck & Gable, 2000) and has demonstrated good internal consistency and content, construct and concurrent validity (Beck & Gable, 2003; Cantilino et al., 2007; Karaçam & Kitiş, 2008). The PDSS has also been translated into Chinese in the study of Li, Liu, Zhang, Wang, and Chen (2011). A Cronbach alpha of 0.96 and intra-class correlation coefficient of 0.79 were reported. The study validated it on 387 Chinese mothers within 12 weeks postpartum. They reported a correlation of 0.66 between the PDSS and the EPDS. Test-retest reliability ranged from 0.63-0.83 across dimensions. A recommendation was given for a cut-off value of 98 (sensitivity = 87.5% and specificity = 96.9%) for major postpartum depression. A factor analysis of the PDSS gave rise to a seven-factor model: feeling of disorganized self, self-harm tendency, emotional instability, shame/guilt, sleep disturbance, anxiety/feeling of insecurity, and disturbed eating habits.

Pereira et al. (2011) validated the PDSS on pregnant women in their third trimesters (N=503) against DSM-IV criteria (APA 1994) and ICD-10 (WHO 1992). Eight items were adapted for use in antenatal depression. Changes included replacing expressions mentioning the baby with "pregnancy" or "future baby". It demonstrated a high internal consistency of 0.94 with a Cronbach's alpha greater than 0.75 for all dimensions. It also correlated highly and significantly with the BDI-II. Satisfactory sensitivity and specificity combinations (≅80%) were reported. Zhao, Kane, Wang et al. (2015) compared the EPDS and the PDSS among 842 pregnant women with complications. They pointed out that the PDSS, although demonstrating good performance to discriminate between depressed and non-depressed women and having greater accuracy than the EPDS, nevertheless could give rise to inaccurate screening. In particular, 2.97% women with a normal score on PDSS were shown to score above the clinical cut-off score on the EPDS. The study reported that 1.66% of women who scored within the borderline range on PDSS (60–79) were shown to have an EPDS score greater than 13, indicating a need for further professional assessment of an elevated risk for major depression. (Zhao et al., 2015).

The PDSS will thus not be included in empirical studies in this thesis. This is because its discriminate validity was only established on a Chinese postpartum sample. Only one validation study on pregnant women was found. Hence, it leads to an uncertainty as to how stable its psychometric characteristics are in other pregnant groups in China.

3.2.6 The Multidimensional Depression Assessment Scale (MDAS)

A 52-item multidimensional depression assessment scale was developed by Cheung and Power (2012). It assesses depressive severity in 4 domains of depressive symptoms: emotional, cognitive, interpersonal, and somatic. Apart from the cognitive subscale, which contains 16 items, all subscales contain 12 items. During its development the scale was trialled among 85 Clinical Psychology trainees to identify the most prevalent depressive symptoms. Further checking with psychiatrists added to the face validity by leaving out 4 symptoms regarded as atypical (Cheung & Power, 2012). In the pilot study by Cheung and Power (2012) on 100 community participants, they reported good psychometric properties of the English version, including a high Cronbach's alpha for the whole scale (0.87) and each sub-scale (emotional = 0.87; cognitive = 0.88; somatic = 0.83; interpersonal = 0.89). A significant high positive correlation (0.77) between the new scale and BDI-II indicated a good convergent validity and therefore the preliminary result laid a good foundation for further investigation of its performance on clinical samples and its validation for clinical usage.

The MDAS was chosen to be used in the empirical studies on Inner Mongolia depressed patients and pregnant women for two reasons. First, in line with the study by Wong et al. (2012), the MDAS contains an interpersonal subscale that can capture the cultural expression of the depression construct in the Chinese population. Several areas of the main focus of the interpersonal aspect in depression are covered in the 12 items in MDAS. They include: 1) Interpersonal inhibition: Decrease in activities,

Social withdrawal, Social avoidance; 2) Lack of assertiveness and low self-esteem: Feeling worse than others, Feeling a burden on others, Feeling undeserving of others care, Feeling less attractive than others; 3) Interpersonal sensitivity: Hypersensitive to criticism, Feeling too sensitive to others; 4) Feeling let down by others; 5) Dysfunctional interpersonal relationships: Unable to love others, Aggression towards others. In other words, the interpersonal symptoms in the new scale contained a varied direction of interpersonal performance in which "social withdrawal", "social avoidance", and "feeling a burden on others" were found to be one of the indicators of severe depression. "Feeling worse than others" and "Feeling undeserving of others care" lay at the milder end of the severity spectrum of depression.

The MDAS could potentially be appropriate for use with Inner Mongolian populations, because it includes a full spectrum of interpersonal symptoms of depression, which have been reviewed to be important in collectivistic societies and are missing in other self-report instruments designed to measure depressive symptoms. The scale has its strengths in having sufficient item content to facilitate detecting the multi-dimensionality of depressive symptoms. As a result, it will be used in chapter 4, 5 and 6 to examine its psychometric properties and will be used to explore symptom patterns in clinical patients and pregnant women in Inner Mongolia.

3.3 Reflections on the reviewed self-rating scales for antenatal depression

This review of the five most commonly validated and used self-report instruments during pregnancy in section 3.2 conveys several messages. First, it highlights the shortcomings of the current self-report instruments, which will be discussed further in the following section, and the development, and validation of self-report questionnaires on antenatal depression in a Chinese population. Secondly, it also introduces the MDAS as a possibly more suitable self-report questionnaire for Chinese

pregnant women. In the following section, the shortcomings of the reviewed scales are discussed.

3.3.1 Shortcomings of the reviewed self-report scales

Regarding the shortcomings of current self-report instruments, all of these scales have been reported to have various factor structures (Table 3.1). Extensive studies of the EPDS reported 2 and 3 factor structures (Kozinszky, Töreki, Hompoth, Dudas, & Németh, 2017; Odalovic et al., 2015) and was reported to have variations in factor structures across and within cultures (Kozinszky et al., 2017). In addition, the BDI has also been shown to have a latent dimension of anxiety-related symptoms, which also appears in non-childbearing samples (e.g. Lloyd- Williams, Friedman & Rudd, 2000; Brouwers, Van Baar & Pop, 2001; Ross, Gilbert Evans, Sellers & Romach, 2003). In addition, the HADS was reported to have similar problem as the BDI in that it does not distinguish clearly between depression and anxiety (Jomeen & Martin, 2005; Brouwers et al., 2001). The instability of its factor structure across pregnancy could also have a negative impact on its validity and reliability, especially when it is used to predict a future risk of postnatal depression (Karimova & Martin, 2003).

Another concern lies in terms of the content of the measures. Some instruments (i.e., BDI-II, PDSS), have been developed in part with a diagnostic purpose, while others (i.e., CES-D) are intended to measure epidemiological prevalence (Price & Handrick, 2009). The Patient Health Questionnaire (PHQ-9), has been validated in various primary caring settings and populations with cut-off values and scoring guidelines that accurately reflect diagnostic levels of depression severity (Kroenke, Spitzer, & Williams, 2001). However, the overlap of somatic complaints with medical symptoms of pregnancy casts doubt on whether it can adequately differentiate depressed pregnant women from non-depressed ones (Kroenke et al., 2001). The EPDS, though avoiding somatic symptoms, was criticized in that it does not contain pregnancy related

depressive symptoms (Jomeen & Martin, 2004). The PDSS is more relevant to pregnancy and the postpartum period but it has been less studied or validated with other depression scales such as the BDI-II and the HADS. In terms of screening across cultures, as reviewed in Chapter 1 and 2, interpersonal symptoms are missing in this and in other reviewed scales. They are in fact not comprehensively examined in the 15 most commonly used depression scales, including the BDI-II, PHQ-9 and EPDS, while only 2 interpersonal items were found in the CES-D (Cheung & Power, 2012). Some British idiomatic phrases such as "things have been getting on top of me" in EPDS could result in losing its meaning when translated into other languages. Similarly, "restless" in BDI could also lead to difference in interpretation across cultures (Brodey et al., 2016).

In addition, concerns regarding the specificity and sensitivity of the scales were reported. Scales such as the BDI-II and the CES-D were reported to have a higher specificity for detecting clinically significant levels of depression but are less sensitive to distinguishing postpartum depression from major depression. The EPDS and the PDSS, on the other hand, have greater sensitivity to depressive symptoms and/or emotional distress below the diagnostic threshold (Boyd et al., 2005). A systematic review by Gibson, McKenzie-McHarg, Shakespeare, Price, and Gray (2009) suggested that the EPDS might be more sensitive when administrated in the English language and for women who are more familiar with reporting symptoms in English. The sensitivity of the EPDS, in Mosack and Shore's (2006) study on detecting antenatal depression, was also found to be lower than that of the CES-D. For a group of 121 participants, the CES-D classified 6 more cases of prenatal depression than did the EPDS, which did not identify any prenatal depression among participants, nor did it identify any woman to be depressed during the early postpartum period. Because the EPDS did not classify any pregnant women in their sample to be depressed, Mosack and Shore (2006) suggested that its utility might be restricted to postpartum depression screening. The researchers also suggested that the CES-D outperformed the EPDS in capturing a broader spectrum of depressive symptoms. It also benefits in identifying women who are at risk for depression that allows support and referrals. The EPDS, in turn, generated a slightly higher percentage of correctly identified cases than the PHQ-

9 during pregnancy (Flynn et al., 2011), suggesting that it may be a better screening tool than the PHQ-9. As a result, conclusions about the best tool for screening and measuring depression during pregnancy are yet to be drawn.

Finally, scales such as EPDS and BDI were criticised of having long response options, which also vary in each question. Compared to the fixed and one-word response options in likert scale, long responses options pose greater effort for respondents to read and interpret the survey and prolongs administration time (Brodey et al., 2016). This thus become a disadvantage as screening tools in primary care settings.

3.3.2 Using the reviewed scales in a Chinese pregnant population

Among the 14 reviewed scales, only a few scales have been validated on Chinese pregnant women (EPDS, HADS, PDSS, and GHQ). Among which only one validation study was found for each scale. None of the scales has been tested on Inner Mongolia pregnant women. The remaining scales, such as the SDS, PHQ and CESD were used on a pregnancy population in China without prior examination of their psychometric properties (Wang, Wang, & Ma, 1999). This leads to negative consequences in terms of developing and choosing suitable screening tools for a Chinese pregnant population. A limited number of validation studies on self-report scales also hinders comprehensive statistical comparison and meta-analysis.

One important issue arising from direct adaptation of existing scales is the choice of optimal cut-off value, which varies across populations and trimesters of pregnancy. Using a cut-off value only validated in a Western sample could result in a possible inaccuracy in screening. For example, a lower cut-off value of the EPDS has been suggested in Chinese pregnant women (section 3.2.1). This review highlights that more work should be done in the future to validate and develop self-report scales in China.

The second issue arising from the review is the overlooking of validity in the study of psychometric properties. Validation studies in Chinese populations emphasize greatly on reporting reliability. Indeed, reporting internal consistency is common in scale development but could be problematic for depression measurements. Internal consistency depends on the inter-correlations of items. High inter-correlations indicate a large likelihood that items are measuring the same underlying construct. A high Cronbach's alpha therefore points to the good psychometric quality of a scale. Withr this approach, items that are not highly correlated with other items are flagged as problematic and are usually dropped from the scale to improve internal consistency. However, given the heterogeneity of depressive symptoms, it could result in dropping symptoms that are crucial to some people. This could lead to a loss of important data. The heterogeneity of symptom profiles of depression also indicates that the occurrence of symptoms could point to depression or other mental or physical disorders (Fried, 2014). For example, Shafer (2006) investigated four commonly used scales (i.e. BDI, HAM-D, CES-D, and SDS) and reported that none of them endorsed all DSM criteria of depression, despite their presumption to measure the same latent disorder (Shafer, 2006).

Thirdly, studies have highlighted the limitations of DSM and criticized that its framework of MDD symptom criteria could hinder identifying culturally specific symptoms (Chang et al., 2008). DSM diagnostic criteria are largely based on clinical consensus rather than empirical evidence (Lux, Aggen, & Kendler, 2010). Its symptoms greatly resemble the symptoms proposed 40 years ago. There has been a call for evaluation of psychometric characteristics of symptoms (e.g. Lux & Kendler, 2010; Mitchell et al., 2009). For example, in the study of Chang et al. (2008), the Korean sample did not endorse highly the "depressed mood" which is a necessary criterion for diagnosis, suggesting a lesser tendency for Koreans to make complaints of "depressed mood" even when they are in depressed states. Rather, the Korean sample reported symptoms such as "low energy" or "concentration difficulty" in the early stage of depression. Furthermore, the gold standard for depression assessment, the Hamilton Depression Rating Scale (HAM-D), was established over 5 decades ago. Its psychometric properties were however demonstrated to be unsatisfactory (Bagby,

Ryder, Schuller, & Marshall, 2004) with items showing poor inter-rater, re-test reliability and content validity. Despite the evidence, it has been widely used in outcome measure of clinical trials and in validation studies against other scales (Demyttenaere & De Fruyt, 2003).

In fact, validation studies of EPDS in Chinese populations have reported moderate concurrent validity, as seen in the Spearman co-efficient of 0.58 between the EPDS and BDI total score (Guo et al., 2009). Similarly, Liu (2010) reported a correlation of 0.66 between PDSS and EPDS. In a non-pregnant population, for example, Zheng and colleagues (1988) showed a poor correlation between seven symptoms in the Chinese Beck Depressive Inventory (CBDI). These were loss of libido, sense of punishment, self-hate, self-accusation, crying spells, irritability, and somatic preoccupation. This is consistent with the cross-cultural validity of the depression concept (e.g. Marsella et al., 1985) that the Western construct of depression cannot be unquestioningly applied to Chinese populations. As a result, investigation is needed to examine the cultural expression of depression in a Chinese population and to facilitate selecting the more appropriate indicators of depression.

This review of measures sheds light on the implications of using factor analysis of self-report scales to investigate symptom profiles. As reviewed in chapters 1 and 2, the Chinese construct of depression is influenced by the integration of mind-body and social context (Wu, 1982), as well as the interpersonally oriented and collectivistic nature of Chinese society (Markus & Kitayama, 1991). The experience of antenatal depression in Chinese women could further be shaped by child policy and traditional family dynamics. Consequently, interpersonal symptoms and risk factors could play an important role in the symptom profile of depressed Chinese pregnant women. The review also highlighted that interpersonal symptoms were less emphasized in the main self-report questionnaires. Almost all of the depressive assessment scales omit interpersonal symptoms (Cheung & Power, 2012). They have limited information of the symptom content and focus only on universal core symptoms of depression (Chang

et al., 2008; Kendler et al., 2015). In particular, the widely used CES-D contained two items on interpersonal functioning (unfriendly, feeling dislike), and the EPDS contained only one item. Hence, having a more comprehensive list of interpersonal symptoms in the MDAS (as reviewed in 3.2.14), the role that social factors plays in depressive symptom profiles can be investigated (Dere et al., 2013). It could lead to the possibility of developing a culturally sensitive self-report instrument in an Inner Mongolia population that could also fit other collectivistic regions of China.

This review of studies points to the benefit for the translation and validation of MDAS, a scale in which the full spectrum of symptoms considered in DSM is modified and implemented based on empirical evidence to match the symptom profile of antenatal depression. Interpersonal symptoms and certain somatic symptoms need to be included in such a scale. In addition, the screening instrument should allow a quick assessment and be handled by people without additional expertise in mental health diagnostics. Such a scale should also provide an avenue for nurses to initiate a conversation about the circumstances that result in the depressed mood and assess the need for referral to a mental health professional.

3.4 Chapter summary

This chapter provides a review of the self-report scales developed and validated on pregnant women across populations outwith and within China. It highlights the paucity of validation studies for self-report instruments among Chinese populations. There is also no scale developed specifically for antenatal depression in China. Given the potential cultural difference in symptoms of depression, this review has raised concern about the cross-cultural adaptation of existing self-report scales based on a Western concept of depression, leading to a question about the validity of the scale for a Chinese population. Previous studies on the symptomatology of depression in China all pointed to the importance of added interpersonal symptoms in self-report scales to facilitate more accurate screening. The next chapter reports a study using a translated version of the New Multidimensional Depression Scale (Cheung & Power, 2012), with a Chinese clinical sample. This will test the suitability of the MDAS for use with Chinese populations, before applying it to pregnant women in China.

CHAPTER FOUR

A STUDY OF DEPRESSIVE SYMPTOM DIMENSIONS IN INNER MONGOLIA CLINICAL PATIENTS

4.1 Introduction

An account of the general characteristics of depression was given in chapter 1 which considered the social cultural context that could influence symptom expression in China. This chapter presents study 1 of the thesis, which aimed to examine the psychometric properties of the Chinese version of the Multidimensional Depression Assessment Scale (MDAS) in a sample of clinically depressed patients in Inner Mongolia. As reviewed in chapter 3 (section 3.2.6), MDAS has the strength of inclusion of a 12-item interpersonal subscale. The scale was thus hypothesized to facilitate the study of symptom profiles through examining the factor structure of this scale in an Inner Mongolia population. This study provided the first set of Chinese data using this scale and gave insights into the expression of depressive symptoms among Chinese people. This study is necessary before carrying out the empirical work on the investigation of depression among pregnant Chinese women (Chapter 5).

4.1.1 Cultural expression of depressive symptoms

Cross-cultural discrepancy in depression prevalence has yielded a lower prevalent rate in China (Gu et al., 2013). However, a recent large scale study of depression prevalence in four provinces of China (Shandong, Zhejiang, Qinghai and a prefecture of Gansu province) revealed a high prevalence rate of depression in the Chinese population, suggesting that depression is also a serious mental health issue in China (Phillips et al., 2009). Chinese populations have been recognized to have a lower tendency to report psychiatric symptoms unless they become very impairing. This is recognized as ‘cultural stoicism’ (Chang et al., 2008; Liao et al., 2012). For example, Parker, Chan, Tully, and Eisenbruch (2005) found that Chinese immigrants who were

more acculturated to Australian culture had a greater tendency to report persistent and impairing depressive episodes.

It is a reasonable anticipation that depressive symptoms are conceptualized differently in Chinese societies than in the West, even among Chinese societies (Mainland China vs. Hong Kong and Taiwan). Chinese individuals tend to endorse higher levels of collectivism and lower levels of individualism than Western individuals (Oyserman et al., 2002). The influences that social-cultural factors have on recognizing and describing depressive symptoms were introduced in Chapter 1 (Section 1.4). Even in societies that share similar cultural heritage (e.g. Hong Kong and Taiwan), people perceive their happiness and life satisfaction differently when they experience different social and political systems (Liao, Fu, & Yi, 2005). It thus affects the diagnosis and understanding of the nature of the illness (Kleinman, 1988; Kleinman, 2004; Parker, Cheah, et al., 2001). However, somatization of depression in Chinese populations has been the main focus of exploring cultural differences in symptom expression (Kleinman, 1982). Ji and Zhang (2002) found that the majority of depressed Chinese patients reported changes in appetite, insomnia, chest discomfort, palpitations, and fatigue primarily, rather than the core symptoms recognised in the West as sadness or depressed mood. There are a few reasons for this cultural difference. The Chinese mind-body integration in the epistemology of disease suggests that psychological distresses are conveyed through physical complaints. In addition, somatic complaints are more likely to attract care and sympathy than psychological ones. Psychological distress can often be seen as a character flaw, or personal weakness, eliciting stigmatization and criticism (Georg Hsu et al., 2008). Finally, somatization can serve the function of help-seeking for Chinese individuals, who selectively express somatic symptoms to health professionals rather than mood-based depressive symptoms (Cheung, 1995).

Contrary to the above, more recent studies of Chinese symptom expression of depression suggest that Chinese individuals, such as depressed college students, put less emphasis on somatic symptoms. Studies showed that somatic and cognitive affective symptoms were not associated with their attitudes towards help-seeking

behaviour (Chang, 2007). In fact, being interviewed by clinicians and reporting depressive symptoms on self-report instruments could influence people's expression of depressive symptoms. Apparently, cultural differences were found to have the strongest effect in studies employing structured interviews but vanished when using self-report questionnaires (Chang, 2007; Ryder et al., 2008), as Chinese individuals are more likely to report somatic symptoms during clinical interviews (Chang, 2007). However, assessment of symptoms using self-report instruments is restricted to the set of symptoms presented in the questionnaires. While the majority of the existing studies focus on somatization, the role that interpersonal factors play in depressive symptom profiles remains unclear, despite their cultural and theoretical importance (Dere et al., 2013). Overlooking the phenomenology of depression in a Chinese population prevents deeper understanding of its nature (Wong et al., 2012). Chapter 1 also outlined how Chinese individuals could use interpersonal symptoms to convey psychological distress. Interpersonal relationship issues, such as not dealing with things well, being apologetic, and feeling ashamed for bad behaviour can be used to reflect guilt and failure. Complaints of being less capable than others and not being cared for by others can be used to convey negative self-perceptions and hopelessness (Zheng, 1986). These concepts were postulated in Zheng (1986) but have not been further explored in detail since then, neither were they addressed fully in development of self-report depression scales as reviewed in chapter 3.

4.1.2 Validation of the Chinese-MDAS on clinically depressed patients in Inner Mongolia

The current study focused on validation of a self-report instrument, the Chinese version of Multidimensional Depression Assessment Scale (MDAS) on clinically depressed patients in a more collectivistic part of China, Inner Mongolia, and an examination of the factor structure of the MDAS. It is believed that these individuals are under greater influence from the collectivistic culture due to historical reasons than Chinese immigrants in Western countries, and those from more westernized regions such as Hong Kong, Taiwan and Shanghai. As reviewed in section 3.2.6, the English

version of the Multidimensional Depression Assessment Scale (MDAS) was developed to assess four dimensions of depressive symptoms (emotional, cognitive, somatic and interpersonal). It showed good psychometric properties and the original hypothesized four-factor model showed moderately good fit on a mixed community sample in the UK and Hong Kong (Cheung & Power, 2012). However, the Chinese version has not yet been validated in a clinically population in Mainland China, especially in Inner Mongolia clinically depressed patients. Hence, its clinical usage in an Inner Mongolia is yet to draw any conclusions. Upon its development, the MDAS was hypothesized to be used as a four-factor structure corresponding to each subscale. However, no prior knowledge has been generated about the factor structure of clinically depressed Inner Mongolia patients. As a result, the data-driven method of EFA is an appropriate approach in this study due to the novelty of carrying out a dimensional assessment for the MDAS in this population. The factor model established in this study allows subsequent comparison of best-fit factor models on pregnant women in Inner Mongolia using confirmatory factor analysis (CFA) with the purpose to gain a better understanding of the best-fit dimensional structure of the MDAS for a pregnant population in Inner Mongolia (see Chapter 5). The results of the current study and the subsequent studies in chapters 5 and 6 have important clinical implication for understanding of depressive symptoms in Inner Mongolia and the application of screening tools in the area as well as other collectivistic areas in China.

Furthermore, this study also presents a factor-analytic investigation to facilitate the understanding of the nature of depression (Bos et al., 2009) through the factor structure of Chinese-MDAS, which has not been studied on Inner Mongolia clinical sample. Factor-analytic studies provide more insight into the dimensions of symptom patterns that studies focusing on total score of depressive scales are less capable of (Costello, 1993). However, frequently used depression rating scales are less able to capture the detailed phenomenological picture of depressive symptoms, as they were primarily designed based on theoretical grounds with particular purposes, such as reflecting changes in symptoms during treatment. Available symptom scales may also have insufficient item content to assess the multidimensionality of depression (Vares,

Salum, Spanemberg, Caldieraro, & Fleck, 2015), as each depression instrument emphasizes certain aspects of depressive symptoms. For example, the PHQ-9 puts its weight on somatic items, whereas the BDI-II mainly emphasizes cognitive symptoms of depression (Vares et al., 2015). Symptoms included in a study of symptom patterns have been recommended to expand beyond the current DSM and ICD criteria and to be broad enough to allow the detection of possible subtypes (van Loo et al., 2012). Similarly, a systematic review of depressive symptom patterns by van Loo, de Jonge, Romeijn, Kessler, and Schoevers (2012) revealed unstable factor structures of depressive symptoms and as such it was unable to draw a clearer picture of the factor structure of depressive symptoms. It was suggested that choosing a scale with a more complete phenomenological picture of depressive symptoms could facilitate locating symptomatic subtypes or dimensions in the data-driven approach and thus lead to better efficacy in screening.

Regarding studying symptom profiles across populations and cultures, Marsella (1987) and Fabrega (1996) highlighted the importance of comprising five dimensions in depression scales: affective, somatic, interpersonal, cognitive, and existential. For example, Marsella, Kinzie and Gordon (1973) investigated the different symptom profiles among Japanese, Chinese and European Americans using factor analysis. They reported greater somatic complains (e.g., headaches, insomnia, and digestion problem) among Chinese Americans, more interpersonal problems among Japanese (e.g., afraid of meeting new people and reluctance to socialize) and more affective and existential symptoms (e.g., loss of interest, hopelessness, depressed mood, suicidality, and memory problems) among European Americans. Abundant evidence on somatization and collectivism on an Asian sample, in particular Chinese depressed population, argued for the importance of assessing depressive symptoms using a multidimensional framework (Kalibatseva & Leong, 2011), because of the varied endorsement of depression across ethnic and racial groups. To date, the Centre for Epidemiologic Studies Depression Scale (CES-D) has been widely used in cross-cultural studies of depression, but it is the only self-report depressive scale that

assesses interpersonal symptoms of depression, containing two items in the interpersonal factor in the original analysis by Radloff (1977).

Research into the factor structure of Mainland Chinese is important because this population experiences different economic, social and cultural contexts compared to Western societies and more Westernized Asian cultures such as Hong Kong, Taiwan, Beijing, Shanghai, and Guangzhou (Liao et al., 2015), where most of previous studies have been conducted. In particular, Mainland China pursues government planned economic and socially related policies and puts more focus on collectivism (Liao et al., 2005). As a result, this study explored the factor structure of the MDAS. In exploration of the factor structure of the MDAS in clinical patients in Inner Mongolia, using exploratory factor analysis could lead to identification of factor models and a description of relationships between symptoms.

4.1.3 The present study

In light of the above, the current study investigated the psychometric properties and symptom dimensions in depressed patients in Inner Mongolia. The Chinese version of the MDAS (Chinese-MDAS) was translated and validated against the traditional psychometric standards of validity and reliability (Nunnally, 1978) in the Classic Test Theory (CTT). The study also explored the symptom profile of clinically depressed individuals in Inner Mongolia with Exploratory Factor Analysis (EFA). Beginning with the raw data of the MDAS without presumptions, factors emerged to reflect how individual depressive symptoms correlate with each other. The clusters of symptoms were examined looking at factor loadings of individual items in the MDAS. Comparing the results with the existing literature in factor-analytic studies, the study provides insights into the universal and culturally specific symptom profile of depression for Inner Mongolia depressed people.

In this study, there are 2 main research questions to be answered:

1. Does the Chinese version of MDAS demonstrate good psychometric properties when used with a sample of clinically depressed Chinese patients in Inner Mongolia?

   Prediction: According to the literature review in chapter 1 (section 1.3.2), inclusion of interpersonal symptoms in depression assessment scales is generally supported (Wakefield et al., 2010). The MDAS is predicted to demonstrate adequate psychometric properties for the Chinese depressed patients.

2. What are the factor structures of the MDAS in clinically depressed individuals in Inner Mongolia

   Prediction: In section 1.7.1, Chinese culture affects the expression of depressive symptom expression. Interpersonal symptoms are expected to emerge in factor analysis due to their important role in the Chinese social and cultural contexts.

4.2 Methods

4.2.1 Design

This study adopted a cross-sectional quantitative design.

4.2.2 Participants

This study recruited 171 depressed outpatients in mental health facilities in Hohhot. The major site for data collection was the Mental Health Centre, Hohhot. It is the largest mental health facility in the province of Inner Mongolia and it admits patients from mixed ethnic backgrounds of Han and Mongols. In this study, only Han patients were recruited to ensure that all participants could comprehend simplified Chinese characters. Secondly, Han Chinese in Inner Mongolia live under the same policies (e.g. one-child policy) as residents in other provinces of China, while Mongols are less restricted by the Central government of China. Inpatients who were formally diagnosed with major depressive disorder (MDD) and those who were over 18 years of age were invited to participate in the study. As shown in table 4.1, participants' ages ranged from 19 to 83. The mean age was 43.79 (S.D= 13.55).

The Chinese participants in this study had been diagnosed with MDD based on the diagnostic manual of the Chinese Classification of Mental Disorders Version 3 (CCMD-3) (Chinese Society of Psychiatry, 2001). CCMD-3 was published in 2001 (Chinese Society of Psychiatry, 2001). During its development from 1996 to 2000, the diagnostic criteria were referred to the Research Criteria of ICD-10 (WHO, 1993) and the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) of the American Psychiatric Association (APA, 1994). The classification was revised based on the results of the field trials, which involved 114 psychiatrists from 41 mental health facilities (Chen, 2002). In order to facilitate various culture-specific symptoms and disorders the manual included some specific mental disorders (Chinese Society of Psychiatry, 2001). CCMD-3 is used by the majority of mental health professionals in China. According to the survey by Zou et al. (2008), it was used among 64% of clinicians, after which was ICD-10 with 29% of mental health professions using it. Zou et al. (2008) reported it to be used mostly in scientific research and teaching hospitals, while a growing number of psychiatrists used ICD-10 for classification and diagnosis. In terms of depression, a diagnosis requires patients to have experienced at least 2 weeks of depressed mood together with meeting at least 4 out of 9 additional criteria including, but not limited to, lack of energy or fatigue, sleep disturbances, and suicidality. In addition, the symptoms must cause social

functioning impairment or subjective distress, which must not be caused by organic mental disorders or schizophrenia. Diagnostic criteria provide for specifying the type of depressive episode, such as psychotic depression, recurrent depression, dysthymia, or bipolar depression (Chen, 2002; Zhang, 2010). During the diagnostic interview at least three psychiatrists have to be present and reach consensus on the diagnosis result. This gives a high validity of the diagnosis for depression and only patients formally diagnosed with major depressive disorder (MDD) were invited and included in the study. Table 4.1 shows that the largest percentage of participants were female (68.5%), with higher education (34.7%), in full-time employment (48.2%) and were married (78.4%).

Table 4.1 Descriptive statistics of the clinical sample in Inner Mongolia

Demographic variables	**N**	**(%)**			
Male	53	31.5	Previous History of depression prior to the current episode		
Female	115	68.5	Yes	82	49.1
Educational Attainment			No	85	50.9
Primary school	28	16.5			
Middle school	34	20.0			
High school	41	24.1			
Bachelor degree or above	59	34.7			
No qualification	8	4.7			
Marital status					
Single	27	16.2			
Married	131	78.4			
Divorced	8	4.8			
Widowed	1	0.6			
Occupation					
Full time occupation	79	48.2			
Student	7	4.3			
Unemployed	37	22.6			
Other (retired)	41	25.0			

4.2.3 Procedure

Data collection was carried out in collaboration with psychiatrists in the Mental Health Centre in Inner Mongolia. It was conducted in the presence of at least one psychiatrist responsible for the diagnosis and treatment of the participants, and a nurse. The psychiatrist helped to identify potential participants. Patients who met the inclusion criteria were given an information sheet and a consent form. The information sheet contained the brief background for the study, including the rationale and the research aim. It also provided clear information on the average time each participant might need in order to complete the questionnaires, and how the data would be analysed, stored and used. Participants were clearly informed about what they would be asked during the study. If they had any questions regarding the study, the principal investigator was present to answer them. The information sheet also stated clearly the right of the participants to withdraw from the study at any point if they wished to do so. The consent form informed participants about the confidentiality of the information that they provided and the anonymity of the data storage. Copies of the information sheets can be found in Appendix E and of the consent form in Appendix G. Participants were not obliged to answer any questions that made them feel uncomfortable.

Participants who were willing to take part in the study had to sign the consent form before they filled in the questionnaires. However, consent was also gained if the questionnaires were completed and returned by those who did not wish to give their names for additional anonymity. Participants who agreed to take part in the study were invited to a quiet room with a nurse and the researcher. Instructions for each scale were printed clearly on the top of each scale. However, during the study participants could ask questions if they required any clarification of the procedure. If they wished to fill in the question in private, the researcher would go through the information sheet and consent form with them beforehand. For participants who reported having difficulties in reading and understanding the phrases and items on the questionnaires, these were read and explained to them by the researcher, who spoke fluent Mandarin Chinese.

4.2.4 Ethical Issues

This study was conducted under the guidelines of the British Psychological Society (BPS) code of ethics and conduct (Ethics Committee of the BPS, 2009). Ethical approval was granted by the Research Ethics Committee of the School of Health in Social Sciences at Edinburgh University and the Mental Health Centre in Inner Mongolia.

4.2.5 Measures

4.2.5.1 Beck Depression Inventory (BDI)

The Beck Depression Inventory is a 21-item self-report depression instrument developed by Beck et al. (1961) through clinical observations of depressed psychiatric patients. Patients rate the frequency of each symptom that have appeared in the past 7 days on a 4-point scale from 0 to 3. The total score is calculated by summing the item ratings and ranges between 0 and 63. A higher score indicates a higher level of symptom severity. Since its construction, its psychometric properties have been tested and its use has been validated in more than 1000 empirical studies. It has constantly been used as a touchstone for validation of other self-report measures. Past studies reported a Cronbach's alpha range from 0.73 to 0.95 (with a median co-efficient of 0.86) and with most coefficients falling in the middle to upper .80s (Beck, Steer, & Garbin, 1988). The BDI also possesses a high concurrent validity that correlates highly with many other measures of depression; most of the reported validity coefficients ranged from the middle 0.60s to the middle 0.70s (Beck et al., 1988). It also possesses a good ability to discriminate between depressed and non-depressed patients, as well as a high sensitivity to changes in symptoms after patients recover. The scale has been widely studied and translated into multiple languages, including Chinese. The Chinese version of the scale has been shown to have good psychometric properties (Shek,

1990). Zhang, Wang, and Qian (1990) validated the BDI on 335 participants categorized into three groups: non-depressed group (N=268); depressed and depressive neurotic group (N =38) and other neurotic group (N= 29). The study reported a split-half validity of the scale of 0.879 and Cronbach's Alpha as 0.89. Despite the fact that the BDI-II has widely replaced the original version, many studies still use the first version (e.g. Leach et al., 2006; Ueda et al., 2011), due to its availability in China and long history of validation in the Chinese population. The current study therefore used the first version.

4.2.5.2 The Chinese version of the Multi-dimensional Depression Scale (MDAS)

Details of the MDAS can be found in chapter 3 (section 3.2.6).

4.2.6 Chinese Translation of the MDAS

In the parallel back-translation procedure (Brislin, 1986), the 52-item MDAS was translated into a Chinese version by a Chinese-English bilingual investigator. Another bilingual psychologist in Inner Mongolia, who had never seen the scale, back translated the scale into English. The Chinese phrases and vocabulary in the translated version closely adhered to those used in CCMD to increase validity. A Chinese bilingual psychologist checked the translated scale to make the phrases more consistent with everyday usage to increase the readability of the scale. The chief psychiatrist and another senior psychiatrist at the Inner Mongolia Mental Health Centre then double-checked the translated version for accuracy of the translation and cultural adaptation. The translated and back-translated versions can be found in Appendix B.

4.3 Data analysis

4.3.1 Descriptive statistics and tests of normality

Descriptive analysis using mean and standard deviations for continuous data and frequencies for categorical data were used to describe socio-economic characteristics. The Shapiro-Wilk Test of normality was conducted to test the distribution of all variables with a significant p-value indicating normal distribution.

4.3.2 Psychometric properties of the Chinese MDAS

4.3.2.1 Reliability (Internal consistency)

The reliability of the Chinese MDAS and its relevant subscales was assessed using internal consistency (Cronbach's alpha) and Guttman's split-half reliability. Internal consistency refers to the degree of homogeneity that all items in the scale are measuring the same dimension (Streiner & Norman, 2003). The internal consistency was measured by Cronbach's co-efficient alpha (Cronbach, 1951). A Cronbach's alpha reliability statistic higher than 0.70 is necessary for an instrument to be deemed reliable and internally consistent (Kline, 1993, 2000). The split-half test involves dividing the instrument into two equal halves. Based on their similarity in scores the internal consistency is determined. The item-total correlation between each item and the total scale was also calculated to evaluate how well each item was in assessing depression severity and its coherence with the total scale. Items with correlation below 0.4 were considered poor and would be eliminated from the scale (Field, 2005).

4.3.2.2 Validity

The validity of the scale was tested by measurement of convergent, discriminant and construct validity. Convergent validity refers to the degree of whether other well-validated depression instruments (in this study the BDI) are correlated appreciably with the depressive symptoms on the MDAS (Gill, Butterworth, Rodgers, & Mackinnon, 2007; Rozario, Morrow-Howell, & Proctor, 2006). Given the ordinal nature of the BDI and MDAS, the Spearman rank correlation test was performed.

4.3.3 Factor structure of MDAS using Exploratory Factor Analysis (EFA)

Exploratory factor analysis (EFA) belongs to latent factor models, which have been a common statistical technique for identifying subtypes of depression sharing similar symptom profiles. It is a data-driven approach to examine symptom profile and symptom cluster by extracting principal components or latent factors from screening scales. It is also useful in revealing structures in multivariate data and groups of correlated symptoms (Gaskin & Happell, 2014). This method reduces correlated variables to fewer latent factors based on their correlations (Stevens, 2009). EFA is a popular technique to assess the dimensionality of questionnaire scales that measure underlying latent variables. The method facilitates reducing the total number of variables to a smaller number of factors, each of which consists of highly correlated variables.

However, its conventional practices are under criticisms (Baglin, 2014) that the practice requires researchers to make subjective judgements in the choice of extraction method, the number of factors to retain, and the factor rotation technique (Costello & Osborne, 2005). Poor decisions made could thus impact substantially on the results.

Recommendations to improve EFA (e.g. Beavers et al., 2013) face difficulties of implementation in statistical software such as IBM SPSS Statistics (IBM Corp, 2012). For example, the nature of Likert-type rating scales gives rise to ordered categorical data (Lubke & Muthén, 2004). The item distributions were thus anticipated to show non-normality in certain extent. However, the Standard factor analysis model treats them as continuous. It thus violates the assumption for multivariate normality. In this study, a software package FACTOR (Lorenzo-Seva & Ferrando, 2006) was used based on the recommendations made in Baglin (2004). It contains the recommended EFA methods with many powerful features and focuses on the analysis of ordinal variables in Likert-type rating scales. In particular, it evaluates the skewness of the items (presented in appendix A) and chooses Polychoric correlations rather than Pearson correlation. A substantial number of studies demonstrate that using Pearson correlations in conventional factor analysis models can largely deflate the strength of the relationship between ordinal variables. This can result in spurious multidimensionality and biased factor loadings (Bernstein & Teng, 1989). The Polychoric correlation is a technique to estimate the correlation between two bivariate normally distributed continuous variables, which are measured with an ordinal scale (Olsson, 1979). It is adopted in the program (FACTOR) used in this study for the outlined advantages. Supported by studies such as Costello and Osborne (2005), an oblique rotation should be preferred in most situations, which allows inter-correlated factors, unless there is a strong argument for factors to be uncorrelated (Gaskin & Happell, 2014; Matsunaga, 2010).

Principal-component analysis with oblique (Promax) rotations were performed on the MDAS. The reason for choosing oblique rather than orthogonal analysis was because that high internal consistency and high inter-item correlation were found on MDAS. It is reasonable to postulate that factors extracted would be correlated. Oblique rotation is thus more advised than orthogonal. In terms of factor extraction, the Parallel analysis-based method was used in this study. It was shown to outperform Horn's PA and PA based on principal axis factoring (Humphreys & Ilgen, 1969), as well as Kaiser criteria and scree plot (Baglin, 2014). The PA-MRFA used in this study was proposed

by Timmerman and Lorenzo-Seva (2011) computed based on random permutation of the sample data and comparing the percentage of common variance extracted by MRFA. The factor model was constructed based on identifying the salient individual item loadings in the EFA factor pattern matrix. All items were allowed to load on only one factor. Items with crossed loadings were deleted from the model. The complete output of the EFA generated by FACTOR is included in Appendix C.

4.4 Results

The results section presents descriptive statistics (4.4.1), followed by sections that answer the 2 research questions.

4.4.1 Descriptive Analysis

Table 4.2 shows the summary statistics of the total scores of the Chinese-MDAS, each subscale and the BDI. The Shapiro-Wilk test of normality (Shapiro & Wilk, 1965) indicated that the total score of MDAS and cognitive subscale item had a significantly different distribution from normality. The total scores of the remaining three subscales were normally distributed. Descriptive statistics (mean, standard deviation, skewness and kurtosis) of individual items on the MDAS can be found in Appendix A.

Table 4.2 Descriptive statistics for the scores of the new scale, BDI and the subscales

Total Score	N	Mean	S.D	Min	Max
MDAS total score	171	143.84	41.65	59	257
Emotional subscale	171	34.70	10.24	12	58
Cognitive subscale	171	44.19	14.87	16	79
Somatic subscale	171	33.56	10.07	13	60
Interpersonal subscale	171	31.40	10.60	12	60
BDI total score	171	25.31	11.92	0	63

In terms of item-level analysis, 12 of the 52 MDAS items showed statistically significant skewness ($p < .01$), and 47 of the 52 MDAS items evidenced statistically significant kurtosis ($p < .01$). In addition, results of the Shapiro-Wilk test of normality (Shapiro & Wilk, 1965) indicated that each MDAS item had a significantly different distribution from normality. As the 52 items on the MDAS consisted of Likert-type items, the item distributions were expected to demonstrate some degree of non-normality. These distributional findings provided evidence for the non-normality of the MDAS items and suggested the inappropriateness of using normal-theory estimation procedures in examining the underlying factor structure of the MDAS (Raykov, 2011). The statistical analysis of a more robust method for non-normal data was explained in section 4.3.

4.4.2 Research question 1: Psychometric properties of the Chinese MDAS

4.4.2.1 Reliability (Internal consistency)

High Cronbach's alphas were found for the whole scale (0.97) and the four subscales: emotion subscale (0.92), cognitive subscale (0.94), somatic subscale (0.90) and interpersonal subscale (0.92). In terms of item level, none of the 52 items was found to have an item-total correlation below 0.4, and thus all were retained in the scale (see Table 4.3). A Guttman Split-half co-efficient gave rise to a high value of 0.91, which indicated good split-half reliability of MDAS.

Table 4.3 Item-total correlations of items in the MDAS

MDAS	Item description	Item-Total Correlation	MDAS	Item description	Item-Total Correlation
Item 1	Low mood	.64	Item 29	Feel slowed down	.65
Item 2	Sadness	.65	Item 30	Fatigue	.68
Item 3	Low spirits	.68	Item 31	Change in weight	.50
Item 4	Gloominess	.73	Item 32	Crying	.54
Item 5	Sad mood	.73	Item 33	Agitation	.66
Item 6	Guilt	.54	Item 34	Slowed movement	.64
Item 7	Unhappiness	.71	Item 35	More pain sensitivity	.42
Item 8	Not cheerful	.73	Item 36	Intestinal problems	.52
Item 9	Irritable mood	.49	Item 37	Decrease in activities	.72
Item 10	Dysphoric mood	.64	Item 38	Social withdrawal	.75
Item 11	Shame	.47	Item 39	Feeling worse than others	.75
Item 12	Anxiety	.55	Item 40	Feel a burden on others	.70
Item 13	Feelings of hopelessness	.68	Item 41	Social avoidance	.71
Item 14	Loss of interest	.70	Item 42	Feeling undeserving of others' care	.66
Item 15	No pleasure	.74	Item 43	Hypersensitive to criticism	.57
Item 16	The future feels bleak	.78	Item 44	Feeling less attractive than others	.53
Item 17	Feeling worthless	.73	Item 45	Feel too sensitive to others	.54
Item 18	Poor concentration	.68	Item 46	Feeling let down by others	.54
Item 19	Self-blame	.70	Item 47	Unable to love others	.61
Item 20	Life feels meaningless	.75	Item 48	Aggression towards others	.47
Item 21	Feeling a failure	.74	Item 49	Poor Memory	.54
Item 22	Ruminations	.68	Item 50	Unable to plan things	.70
Item 23	Thoughts of suicide	.58	Item 51	Feeling disorganized	.73
Item 24	Unable to make decision	.59	Item 52	Unable to care for myself	.63
Item 25	Low energy	.69			
Item 26	Problems with sleeping	.60			
Item 27	Change in appetite	.64			
Item 28	Lower sex drive	.56			

4.4.2.2 Convergent validity

Spearman correlation was calculated between the MDAS and BDI. The correlations are reported in table 4.4. A significant positive correlation ($p<0.01$) was found between MDAS and its subscales with the BDI. The result suggested a good convergent validity of the new scale. A slightly higher correlation was found between the BDI and the interpersonal subscale (0.709) than the other subscales, suggesting that the interpersonal subscale performed at least as well as the rest with a Chinese sample.

Table 4.4 Spearman Correlations of BDI and Chinese MDAS

MDAS and subscales	BDI total score
MDAS total score	0.72**
Emotional subscale	0.59**
Cognitive subscale	0.68**
Somatic subscale	0.63**
Interpersonal subscale	0.71**

**P<.01 (2-tailed)

4.4.3 Research question 2: Exploratory Factor Analysis (EFA)

4.4.3.1 Factor structure of the Chinese-MDAS

EFA employed in this section explored the symptom profile of a clinically depressed sample in Inner Mongolia. EFA was conducted under parallel analysis (Timmerman & Lorenzo-Seva, 2011) with Promax rotation. In contrast to the hypothetical four-factor model, the parallel analysis extracted three factors, which contributed to 55.4% of the total variance (Table 4.6). The table also shows the reliability of each factor.

Factor 1 to factor 3 accounted for 21.8%, 16.0%, and 17.7% of the variance respectively. The Kaiser-Meyer-Olkin (KMO) test gave a good indication of the sampling adequacy (0.93). This result of a high value of KMO suggested that the sample was suitable for factor analysis. In addition, 11 items were deleted as they loaded on to more than one factor (Items 2, 13, 16, 17, 20, 23, 25, 30, 33, 38, 47). A cut-off value of 0.3 was used rather than 0.4; this was due to the consideration of retaining important symptoms of depression in MDAS such as core symptoms like poor concentration, for future validation studies. It also benefits making use of extracted factors as subscales to evaluate the overall severity of depression. They were dropped from the scale and are not shown in table 4.6. Table 4.6 hence listed the resulting factor structure of MDAS with factor loadings of each item on three factors, named as general psychopathology, cognitive-interpersonal (Cog-Interp), and somatic. The Cronbach's alphas of the three factors were also presented in table 4.6 (all > 0.90). The resulting scale excluding the 11 items had Cronbach's alpha of 0.97, ranging from 0.94-0.97 across three factors. The convergent validity of the three factors with BDI ranged from 0.63 to 0.66 (shown in table 4.6). The whole output of EFA including the screen plot and correlation matrix are presented in Appendix C.

Table 4.5 Exploratory factor analysis (EFA), internal consistency and construct validity of the Chinese MDAS

MDAS items	**Factors**		
	General Psychopathology	**Cog-Interp**	**Somatic**
1 Low mood	0.90		
3 Low spirits	0.77		
4 Gloominess	0.70		
5 Sad mood	0.85		
7 Unhappiness	0.93		
8 Not cheerful	0.96		
10 Dysphoric mood	0.45		
12 Anxiety	0.35		
14 Loss of interest	0.90		
15 No pleasure	0.85		
18 Poor concentration	0.31		

26 Problems with sleeping	0.59		
41 Social avoidance	0.38		
6 Guilt		0.80	
9 Irritable mood		0.70	
11 Shame		0.87	
19 Self-blame		0.71	
21 Feeling a failure		0.72	
22 Ruminations		0.56	
32 Crying		0.39	
39 Feeling worse than others		0.65	
40 Feel a burden on others		0.48	
42 Feeling undeserving of others care		0.69	
43 Hypersensitive to criticism		0.54	
44 Feeling less attractive than others		0.61	
45 Feel too sensitive to others		0.41	
46 Feeling let down by others		0.63	
48 Aggression towards others		0.79	
24 Unable to make decision			0.44
27 Change in appetite			0.73
28 Lower sex drive			0.49
29 Feel slowed down			0.79
31 Change in weight			0.55
34 Slowed movement			0.79
35 More pain sensitivity			0.51
36 Intestinal problems			0.74
37 Decrease in activities			0.77
49 Poor memory			0.56
50 Unable to plan things			0.51
51 Feeling disorganized			0.54
52 Unable to care for myself			0.64
Proportion of variance (%)	21.8	17.7	16.0
Reliability (Cronbach's alpha)	0.97	0.95	0.94
Convergent validity with BDI	0.63**	0.65**	0.66**

** $p<0.01$

4.5 Discussion

4.5.1 Psychometric properties of the Chinese-MDAS

In the first part of this study, the MDAS was validated on clinically depressed Chinese patients in Inner Mongolia. Adequate psychometric properties were found with the sample. These included a high reliability indicated across indices including Cronbach's alpha, item-total correlations, and the split-half coefficient. All of the items on the MDAS performed adequately. The reliability statistics found from the studied population suggested a good internal consistency of the Chinese-MDAS despite its equal weight on the multidimensionality of depressive symptoms. Furthermore, a significant high correlation between the Chinese-MDAS and the BDI, including the interpersonal subscale, indicated that the two scales are highly correlated in measuring the depression construct. The result of the first part laid a foundation to explore the depressive symptom profiles in the second part of the analysis.

When it was being developed, the English version of the Chinese-MDAS was tested on a community sample and showed adequate psychometric characteristics (Cheung & Power, 2012). This is the first study examining the Chinese-MDAS on Chinese clinical samples. Validating MDAS with a scale of interpersonal symptoms leads to opportunities for a new screening instrument that could be useful in the Chinese population. In particular, cultural characteristics of depression symptoms could be captured with a multidimensional scale with comprehensive item content. As noted, Inner Mongolia has been little researched in either Chinese or Western literature. Official statistics on depression prevalence is limited, and insufficient training and protocol on screening of depression could lead to a high rate of under-detection and under-diagnosis. An estimation made by the Inner Mongolia Psychological Counsellor Society reported that approximately 20%-30% patients at primary care level experienced undetected depression and could easily be misidentified due to insufficient training of non-specialist doctors. This area is also under a greater influence of collectivism than other provinces in Mainland China (see review in

chapter 1). This could imply that individuals living in Inner Mongolia could experience cultural difference in terms of depressive symptoms, which have not been recognized in previous research.

4.5.2 Factor model of the MDAS in Inner Mongolia depressed patients

The factor analysis in section 4.3.3 is different from the hypothesized four-factor model corresponding to the subscales of MDAS. Instead, the three-factor model consisted of mixed symptoms in various dimensions of depressive symptoms driven by empirical method of EFA. In contrary to the hypothesized four-factor model upon development of the MDAS, the result yielded three factors containing mixed symptoms from different dimensions. The originally proposed four-factor model was researched on Western literature of depression. A deviation from the four-factor structure in this study could therefore indicate Chinese characteristics of depression. This cultural characteristic arose from the analysis EFA as it is a data-driven approach. Similar findings were also reported by Ying et al. (1988, 2000) using CESD. For example, the factor structure of CESD also substantially varied across racial/ethnic groups (Kim, Decoster, Huang, & Chiriboga, 2011). The MDAS appeared to have a strongest factor of mixed symptoms in all four subscales of the MDAS (with emotional and cognitive symptoms in the majority) and two similarly strong factors: Cognitive-Interpersonal and Somatic. The result recognized similarities and differences in symptom expressions, which are also reported in cross-cultural and cross-national epidemiological studies (e.g. Heiby et al., 2002). The results are consistent with existing literature that symptom profiles across cultures reflect more similarities than differences (Jorm et al., 2005). The result of 8 out of 12 interpersonal symptoms emerged in the second strongest factor sheds lights into the cultural expression of depression in the Chinese population in a more collectivistic area of China.

The first factor endorsed a mixture of core symptoms described in DSM (low mood and loss of interest) and highlighted that they are universal across cultures. Symptoms

with the most prominent loadings were emotional and cognitive symptoms, loss of interest and pleasure. The Western construct of depression also emphasizes the affective dimension of depression (Ryder et al., 2008). Depressed individuals living in different countries including Canada, Iran, Japan, and Switzerland commonly reported core symptoms as: sadness, loss of pleasure, anxiety and tension, difficulties in concentrating, low energy level, and feeling inadequate, worthless, and insufficient (Sartorius, Jablensky, Gulbinat, & Ernberg, 1980). Individuals across different countries also reported feelings of guilt, agitation, suicidal ideation, and hypochondria in various proportions (Bhugra, Gupta, & Wright, 1997). The findings of this study were generally in line with previous research that symptom expression across different cultures shares many similarities (Simon, Goldberg, Von Korff, & Ustün, 2002). Furthermore, previous studies have yielded similar factors in the Chinese expression of DSM depressive symptoms. For example, in Yang et al. (2015), the China, Oxford, and Virginia Commonwealth University Experimental Research on Genetic Epidemiology (CONVERGE) study of major depression conducted detailed clinical assessments of approximately 6000 cases of recurrent major depression (MD) in Han Chinese women and a similar number of matched controls. The results of this series of studies showed substantial similarities in factor structure in Chinese women to those in the USA and Europe. Kendler et al. (2015) also reported a similar underlying structure of the DSM criteria for major depression in East Asian, European, and European-American women who met DSM-IV diagnostic criteria for MD. In line with this finding, the factor structure of nine DSM-IV criteria for MD across 15 cities, including China, is reported to be similar (Simon et al., 2002). Similarly, Ryder et al. (2008) failed to support differential item functioning in psychological or somatic symptoms of depression among psychiatric out-patients in China and Canada. This collection of studies supports the notion that the DSM description of depressive symptoms holds the ‘same’ broad definition of depression across nations and cultures. Lai, Tong and Xu (2010) also reported that the first factor with the largest explained variance contained affective symptoms such as sad mood and feelings of emptiness. In addition, the somatic symptom (problems with sleep) and two interpersonal symptoms (social withdrawal and social avoidance) found in factor 1 are also

consistent with the diagnosis criteria of social impairment in DSM. These two symptoms are also present in most self-report instruments.

The second factor (cognitive-interpersonal factor) contains mostly interpersonal items. The emergence of interpersonal symptoms supported the literature review in chapter 1 of interpersonal symptoms being expressed in Chinese depressed patients. It also indicated that Inner Mongolian depressed patients conceptualized interpersonal symptoms with cognitive symptoms. The interpersonal symptoms, emerged in the factor primarily assessed respondents' sense of negative self-awareness in interpersonal interaction and the negative impact on their social relationships. The interpersonal factor has been found also in general populations using other self-report rating scales, including the CES-D (Zhang et al., 2011; Zhang et al., 2012). The finding is consistent with the hypothesis that Chinese people value their position relative to others in society, particularly in their families (Chapter 2). However, it is not a distinctive interpersonal factor that cognitive symptoms regarding indecisiveness, feelings of failure and rumination also loaded highly in the same factor. Since these symptoms involved the process of cognition, it is likely that Chinese depressed individuals interpret them as part of the interpersonal process.

Lai and colleagues (2010) captured interpersonal symptoms such as feelings of inferiority to other people as a weaker factor. A mixture of cognitive/depressive and interpersonal symptoms extracted in this factor is consistent with Ying (1988) on Chinese American community samples. The study produced a factor structure to reveal self-other integration in Chinese expression of depressive symptoms. In Ying (1988), interpersonal symptoms on the CES-D ("people are unfriendly" and "people dislike me") merged with somatic/depressed symptoms such as "restless sleep", and "crying". The result of the study was also replicated in factor 2, which also contained these items. These particular cognitive factors emerged in one factor in Yang et al. (2015). A mixture of somatic symptoms (crying, agitation, more pain sensitivity) with cognitive and emotional symptoms has been suggested in other studies (e.g.) as somatization. As Ying has claimed, this pattern is a Chinese expression of depressive symptoms. In

this study, the factor emerged as the second strongest factor is different from previous studies. This supported that people from a more collectivistic background as Inner Mongolia could have greater expression in interpersonal symptoms as well as somatisation. Wong and colleagues (2012) also found a consistent result from factor structure in their study of Chinese American immigrants. Their study found interpersonal symptoms such as being judged, social comparisons and cut-off relationships as significant characteristics. The study also recognized that Chinese individuals were likely to express depression in terms of interpersonal symptoms. For example, in their study, "Feel less capable than others" was denoted as "failure". This is in line with the result in this study that participants reports of "Feeling worse than others" and "Feel a burden on others" loaded onto the same factor as "Feeling a failure", suggesting a close relationship between these symptoms. Wong et al. (2012) also identified "No one understands or cares about me" and "friendless" as "hopelessness". This finding is coherent with previous findings that Chinese depressed individuals expressed interpersonal symptoms as a substitute for psychological distress. It supports an inclusion of an interpersonal subscale of depression in assessing Chinese depressed individuals. Lin (1989) developed a new depression scale for a Chinese population with 22 items from the CES-D and 6 additional culturally sensitive symptoms. The interpersonal factor enclosing "suspicious of others", "others didn't trust me", "couldn't trust others", "people disliked me", and "people unfriendly" emerged as the second factor in the scale. The items are similar to the extracted in factor 2 in the MDAS. However, the scale developed by Lin (1989) has not been validated since its development. In addition, Tam and Wong (2007) identified themes such as "vulnerability", "need for approval", "role performance within family hierarchy", "familial harmony", and "relational harmony", in depressed Chinese patients with dysfunctional attitudes. Indeed, Chinese depressed individuals are reported to attribute their cause of illness to interpersonal problems. Yeung et al. (2004) found that Chinese individuals are less likely to consider depressed mood as a symptom and depression as a diagnosable medical illness, and are more likely to attribute their symptoms to psychosocial causes.

The third factor comprised mostly of items from the somatic subscale of the MDAS. It also included 1 item (decrease in activities) from the interpersonal subscale and 4 items from the cognitive subscale (unable to make decision, poor memory, unable to plan things, feeling disorganized, and unable to care for myself). Factor 3 appears to reflect items that relate to bodily complaints or somatic symptoms. However, only some symptoms had high factor loadings (>0.7). These included: Change in appetite, feel slowed down, slowed movement, intestinal problems, decrease in activities. Emergence of somatic symptoms in individual factors is consistent with previous studies such as Li et al. (2014) in which two individual factors as weight/appetite symptoms, and atypical vegetative symptoms were reported. In this study, weight and vegetative symptoms were extracted in the same factor with high factor loadings. The Interpersonal symptom of decrease in activities, as well as poor memory, and inability to care for self, which were originally categorized as cognitive symptoms were also extracted with somatic symptoms. This suggests that impairment in social activities, memory impairment and difficulties in caring for oneself may be conceptualized in a similar way as other bodily complaints. Similarly, somatic symptoms such as problems with sleeping mixed with emotional and cognitive symptoms in factor 1. Crying mixed with interpersonal and cognitive symptoms in factor 2.

In terms of somatization, somatization of depressive symptoms in Chinese populations is commonly reflected in a combined emotional and somatic factor (Ying et al., 2000). This is supported in study by Kuo (1984), and replicated with rural Chinese populations (Zhang et al., 2012), and with older populations (Chen & Mui, 2014). Factor 3 in the current study is inconsistent with this pattern that a combined factor of somatic and affective symptoms was not found. However, one somatic symptom (problems with sleeping), emerged in factor 1 which comprised mostly of emotional and cognitive symptoms. This pattern could suggest weak somatization but the result is not conclusive. Somatization could be related to poor knowledge of depression, when people with insufficient emotional expression skills resort to conventional physical ways of expressing their psychological distress (Zhang et al., 2012). It is likely that information on depressive symptoms was more readily available for urban citizens and thus they were more aware of and likely to report their affective and

cognitive symptoms of depression. A study by Ho (1995) also failed to find support for somatization in Chinese populations in China PRC, Hong Kong, and Taipei. Moreover, it is also possible that participants in the current study had less concerns for stigma from the community. This is because they lived in a mental facility with others in the same situation as them. Eventually, it is also likely that depressed inpatients in this study were made aware of the affective and cognitive symptoms from previous assessments of their routine screening. They thus tended to provide the 'right' answers on depression scales by emphasizing the affective part of depression. Future studies on somatization should be conducted with a more direct approach.

Study 1 provides novel data from under-researched Inner Mongolia. Previous studies with Chinese populations have assumed 'cultural homogeneity'. However, Chinese populations with different socio-cultural contexts are subject to within-group variations, which are often neglected (Lai, 2009). This could result in a less accurate picture of symptom presentation. Indeed, Parker et al. (2001), Lee (1999), and Ryder et al. (2008) have introduced the nature of depression in China under its social contextualization that could give rise to possible differences from Western culture. Direct adoption of self-report instruments developed on Western populations and based on Western conceptualizations of depression has hindered advancement in the investigation of Chinese depressive symptomatology (Wong, 2009). As mentioned in section 4.1.2, many depression scales such as the Geriatric Depression Scale (GDS) and CES-D do not contain comprehensive domains of interpersonal symptoms of depression, thus restricting the study of symptom presentation in populations.

However, Study 1 also has weaknesses. For example, the analysis was restricted to a depressed inpatients, which represented the higher range of severity symptoms. Inclusion of a community sample in Inner Mongolia could extend the analysis to less severe expression of depressive symptoms. In addition, factor structure varies across populations and with different depression scales, and future studies using different research designs could be employed.

4.6 Chapter summary

This study validated the Chinese-MDAS on an Inner Mongolian clinical population diagnosed with a major depressive disorder. The Chinese-MDAS showed good psychometric characteristics for use in a clinical setting. Following the discussion of validation of the Chinese-MDAS, its factor structure was discussed.

The strongest factor with prominent loadings contained items that have been specified in DSM diagnostic criteria. This result suggested that core symptoms are universal. At the same time, Inner Mongolian depressed patients also showed cultural sensitivity on symptom profiles. Interpersonal symptoms were retained as a weaker but salient factor, merging with cognitive symptoms. It points to the possible tendency for Inner Mongolian individuals to mix interpersonal and cognitive symptoms when expressing their mental distress.

CHAPTER FIVE

A STUDY OF DEPRESSION AND ASSESSMENT DURING PREGNANCY IN INNER MONGOLIA

5.1 Introduction

The results of study 1 demonstrated the adequate psychometric characteristics of the Chinese-MDAS in depressed patients in Inner Mongolia, indicating that it is potentially useful for clinical implementation in China and could be useful for future studies of the symptomatology of depression. Using exploratory factor analysis, a three-factor structure was reported in study 1, which provided a general overview of the symptom profile of depressed patients in Inner Mongolia, especially how their interpersonal symptoms relate to other symptoms of depression. Similar to previous studies such as that of Lai, Tong, Zeng, and Xu (2010) (section 4.5.2), mixed symptoms of depression from different dimensions emerged as the largest factor. The results also indicate a cultural and social influence on the symptom profile of Inner Mongolia that interpersonal symptoms emerged in the second largest factor. This chapter presents study 2, which focuses on the pregnancy period. The study explored the assessment of depressive symptoms with the Chinese-MDAS among pregnant women where interpersonal symptoms may be especially important. It focused on a sample in which the dimensions of depressive symptomatology have not been studied in prior research, nor has a suitable factor model been assessed for Inner Mongolia pregnant women.

Using the Chinese-MDAS validated on clinically depressed Inner Mongolia patients, study 2 aims to evaluate and compare the model fit of the Chinese MDAS on pregnant Inner Mongolia women using confirmatory factor analysis (CFA). Three models were compared in this study: A three-factor structure obtained from EFA in study 1, the four-factor model corresponding to the four subscales originally designed and a one-factor structure involving all items in a single factor as the depression severity. The last two models were proposed based on the theory of depressive symptoms upon the

development of the MDAS and tested in community samples in the UK and Hong Kong China (Cheung & Power, 2012). Obtaining a factor-structure of MDAS that best fits the pregnant sample in Inner Mongolia will provide important clinical implementation of choosing a valid scale for better screening of antenatal depression and better understanding of the nature of depressive symptoms in pregnant Chinese women.

5.1.1 Interpersonal symptoms and antenatal depression screening in Chinese pregnant women

As reviewed in Chapter 2, a growing body of literature in recent decades reveals that pregnancy is a delicate and complicated phase of life in which physiological changes in reproductive and endocrine systems can increase the risk of mental health problems (Qiao, Wang, Li, & Ablat, 2009). Affonso et al. (1992) reported common emotional difficulties during pregnancy including anger, tension, nervousness, pathological anxiety and depressive symptoms. In particular, depression is the most prevalent mental health difficulties with approximately 50% of pregnant women reporting some depressive symptoms (Affonso et al., 1992). Studies around the world gave rise to a high prevalence rate of antenatal depression, ranging between 5% and 41% (see reviews by Gavin et al., 2005; Lancaster et al., 2010). In particular, many studies focused on women who are in their third trimester of pregnancy (Abujilban, Abuidhail, Al-Modallal, Hamaideh, & Mosemli, 2014; Kim et al., 2008; Records & Rice, 2007). Untreated antenatal depression could lead to deteriorating maternal health (Marcus & Heringhausen, 2009; Orr et al., 2007), greater level of anxiety (Breitkopf et al., 2006; Hart & McMahon, 2006) and a higher chance of postpartum depression (Heron, O'Connor, Evans, Golding, & Glover, 2004; Rubertsson, Wickberg, Gustavsson, & Radestad, 2005). Depressed pregnant women are also more likely to experience a shorter gestation age, complications of pregnancy, including acute or elective caesarean sections, operative deliveries, perineal tears, excessive bleeding, premature contractions, back pain and preeclampsia (Larsson et al., 2004). They also have a greater tendency to develop psychiatric disorders and fear of delivery (Larsson et al.,

2004). Hence, it is important to implement proper screening in antenatal care to identify women who might be at risk for depression during pregnancy.

In China, only recently has attention been turned to antenatal depression, despite a reported comparably high prevalence of anxious and/or depressive symptoms. Greater emphasis has been given to postpartum depression and its negative impact on infant development (review in section 2.3). There has been a clear gap in knowledge regarding the symptom patterns of antenatal depression in China. However, the importance of interpersonal factors in Chinese culture and depression has been introduced in chapters 1 and 2 in the Chinese general and pregnant population. For example, the collectivistic culture contributes to a great tendency in Chinese people to attend to interpersonal relationships and a greater tendency for women in general to be other-oriented (Bernard, 1976). For women, the Confucian paradigm expects the daughter-in-law to make adjustments to adapt to the 'new' family and to show respect and obedience to the older generation (Young, 1995). Often women need to deal with the relationship between her mothers-in-law (Tseng & Hus, 1991). This thus could lead to interpersonal pressure and distress which plays a role in depressive experience. Interpersonal symptoms and risk factors have indeed been examined in many studies but are often under-recognized in antenatal depression, especially in Chinese populations. Some of these risk factors are also symptoms of depression, such as feeling being let down and unloved, feeling tense from arguing, and the frequency of unpleasant and distressing social interactions (Furber et al., 2009). The role that interpersonal symptoms plays in the symptom profile of Chinese pregnant women has never been explored in theChinese population. Previous studies of antenatal depression using total score of self-report instruments result in the symptomatology of antenatal depression being unclear (Sugawara, Sakamoto, Kitamura, Toda, & Shima, 1999) because total scores of self-report instruments provide insufficient information on dimensions of symptoms compared to factor analytic studies (Sugawara et al., 1999).

The limitations with commonly used self-report instruments for antenatal depression are highlighted in chapter 3. Cultural sensitivity to depressive symptoms tended to be overlooked when the scales were first developed in Western populations. Neither has there been a scale that includes a comprehensive list of interpersonal symptoms. The commonly used Centre for Epidemiological Studies Depression Scale (CES-D), for example, which has been used frequently in studying cross-cultural depressive symptomatology (Ying, 1988, 2000), contains only two interpersonal symptoms. This limitation hinders the study of the symptom profile of antenatal depression in the Chinese population and hence the validity of assessment using self-report instruments. In particular, interpersonal symptoms of depression are found to be coherent with Chinese cultural and social contexts. Interpersonal factors also play a crucial role during pregnancy in Chinese women both as pregnancy experience and as risk factors.

In the assessment and screening of antenatal depression in Chinese pregnant women, choosing the appropriate instrument and locating factor models that provide a good fit for the pregnant women facilitates screening with self-report instruments (e.g. Austin, 2004). Moreover, inclusion of interpersonal symptoms in depression assessment could provide information beyond the screening for depression alone. They may reduce the underreporting of depression when physiological symptoms such as changes in appetite and sleep are often attributed to pregnancy itself rather than to depression (Righetti-Veltema, Conne-Perréard, Bousquet, & Manzano, 1998). Interpersonal symptoms are also more socially accepted than reporting emotional distress. They may help to lessen the impact of stigma, which often prevents women from reporting their mental health problems (Gordon, Cardone, Kim, Gordon, & Silver, 2006; Shakespeare, Blake, & Garcia, 2003) and to lead to identifying more pregnant women at possible risk of depression.

To date, less data are available from validation studies before many scales, such as the HADS-D and CES-D, were used on pregnant populations especially in China. A paucity of factor-analytic studies on the scales during pregnancy provided insufficient

information on scale factor structure for a Chinese pregnant population, which is important in clinical implementation. Many of the scales, especially the EPDS, have been reported to have unstable factor structures (Cunningham, Brown, & Page, 2014). Inconsistency in factor structure has been recognized as a weakness of the scales, casting doubts on the construct that the scale is measuring across populations (Cunningham et al., 2014).

Given the limitations of the currently used self-report instruments and a lack of study of the symptom profile of antenatal depression, this study aimed to examine the factor structure of the MDAS for its potential clinical application with pregnant Chinese women. It sought to fill the knowledge gap from previous factor-analytic studies using scales without any interpersonal and somatic symptoms on pregnant women. The MDAS has several advantages for use during pregnancy. First, it is a relatively new measure developed in 2012, comparing with the EPDS, which was developed in the 1970s. During its development, a more up-to-date search on depression literature was included. It also put great emphasis on face validity, which was checked by psychiatrists during its development. Secondly, it takes a holistic approach on presentation of dimensions of depressive symptoms with (Cheung & Power, 2012). In study 1, its psychometric characteristics, including reliability, validity and factor structure were investigated. The results showed that the MDAS is a reliable and valid scale to be used on assessing depression with a clinically depressed Inner Mongolia sample. Previous analytic studies with pregnant samples have also extracted similar factors as the three factors emerged in study 1. For example, cognitive-affective and somatic factors are also found in Latino pregnant women (Alexander et al., 2014). In other words, study 1 has laid good groundwork on the empirical study of testing MDAS on pregnant women in this chapter.

5.1.2 The present study

This study aimed to explore the application of the Chinese-MDAS with Inner Mongolia pregnant women and to investigate its psychometric properties. Specifically it compared three hypothesized factor models of the Chinese-MDAS in order to identify the best-fitting factor model:

(i) The four-factor model was originally proposed by Cheung and Power (2012) upon the development of the MDAS that each factor denotes a subscale (emotional, cognitive, somatic and interpersonal);

(ii)A one-factor model is composed of all the symptoms in the MDAS as a single factor of depression severity. This proposed model represented MDAS as a uni-dimensional scale that measures depression severity;

(ii)The three-factor model emerged from the clinically depressed sample in study 1.

Conducting this research with an Inner Mongolian sample is helpful for several reasons. First, Inner Mongolia is a relatively more collectivistic area and has been barely studied in previous research (details of Inner Mongolia was given in section 1.4.5). Published data on antenatal depression in Inner Mongolia has also not been available. The mental health component of antenatal care for Inner Mongolian pregnant women remains understudied in both research and field service. Searching for a factor model that provides the best fit for Inner Mongolia pregnant women helps clarify the issue of ethnic homogeneity across Chinese populations in current research and brings new insight into antenatal depression in a more collectivistic area. Secondly, the Chinese-MDAS has never been validated with a Chinese pregnant population. Clear guidelines regarding antenatal depression screening and the use of self-report instruments have not been implemented in Inner Mongolia. The current study sought to expand the knowledge through applying a scale with a comprehensive interpersonal subscale on screening antenatal depression in Inner Mongolia and possibly other parts of collectivistic China.

This chapter aims to address 3 research questions:

1 What is the prevalence of depression in pregnant Chinese women in Inner Mongolia?

Hypothesis: Prevalence of depression has not been documented for pregnant women in Inner Mongolia. It is expected that the prevalence rate will be as high as in other parts of China.

2 What is the best-fit factor model of CFA on pregnant women in Inner Mongolia?

Hypothesis: Three models (four-factor, three-factor, and one-factor) were compared and the three-factor model derived from EFA in Study 1 was hypothesized to best fit the sample in this study.

3 Does the best-fit model of the Chinese-MDAS show good psychometric performance with Inner Mongolian pregnant women?

Hypothesis: Good psychometric characteristics are expected to be found in the Chinese-MDAS in this population. Details of the introduction of psychometric characteristics could found in section 4.3.2. However, given that normative physiological experiences during pregnancy include changes in appetite, weight and sleep, low energy levels, loss of sexual interest, fatigue, and mood lability usually overlap with the somatic symptoms of depression (Bernstein et al., 2006), this may give rise to a higher prevalence than in other studies, and a lower item-total correlation of somatic symptoms. In addition, a significant correlation is also expected between the MDAS and the Sheehan Disability Scale due to the presence of interpersonal symptoms which could indicate social impairment.

5.2 Method

5.2.1 Design

This study used a similar cross-sectional quantitative design as in study 1 (Chapter 4). Details can be found in section 4.2.1. To address the research questions, confirmatory factor analysis (CFA) and psychometric analysis were conducted on the best-fit model for the MDAS. See below for details.

5.2.2 Participants

Four hundred women were given the information sheet, questionnaire pack and consent form. Three hundred of them returned the questionnaire (75% response rate). Sixty-six questionnaires could not be used for analysis due to over 70% of the questionnaires being incomplete, including the core part of the questionnaires (the MDAS, BDI and EPDS). The final sample (Table 5.1) consisted of 234 pregnant women with a mean gestation week of 35.56 (S.D. = 5.88). The mean age was 29.13 (S.D. = 3.26), in a range between 22 and 40 years old. The summary descriptive statistics of the sample characteristics are shown in table 5.1. The majority was in their first pregnancy (79%), in their third trimester (93.4%) of pregnancy, and had a bachelor's degree (75.2%). In terms of employment, the majority of participants were in full-time employment (82.5%). An average hour of working of 39 hours per week was found (S.D= 9.53). Over half of them (52.7%) reported working in a professional sphere, including using management and professional skills. Participants were also asked about their history of mental illness and medical conditions. The result shows that 7.7% of patients reported a history of depression.

Table 5.1 Descriptive Statistics of pregnant sample

Demographic Variables	**N (%)**	**Demographic Variables**	**N (%)**
Trimester		**Occupation**	
First	8 (3.5)	Professional	121 (52.6)
Second	7 (3.1)	Administrative	46 (20.0)
Third	212 (93.4)	Service	45 (19.6)
Qualification		Craftsmanship	1 (0.4)
Middle School	13 (5.6)	Labour	5 (2.2)
High School	27 (11.5)	Others	12 (5.2)
Undergraduate	176 (75.2)	**Medical history**	
Postgraduate	18 (7.7)	History of depression	18 (7.7)
Employment		Medication	8 (3.4)
Full-time employment	193 (82.5)		
Full-time student	3 (1.3)		
Unemployed	16 (6.8)		
Others	22 (9.4)		

5.2.3 Measures

5.2.3.1 Beck Depression Inventory (BDI)

Detailed description of the BDI and its psychometric characteristics when used with clinical depressed populations can be found in chapter 4 section 4.2.5.1. A review of the validation studies of BDI on pregnant women can be found in chapter 3 section 3.2.3.

5.2.3.2 Edinburgh Postnatal Depression Scale (EPDS)

A review of the validation studies and description of psychometric characteristics of the EPDS can be found in Chapter 3 section 3.2.1.

5.2.3.3 The Chinese Multidimensional Depression Assessment Scale (Chinese-MDAS)

The Chinese-MDAS was validated in depressed Chinese patients in Inner Mongolia (see detailed description in section 4.4.2), with good psychometric properties including a high internal consistency (Cronbach's alpha >0.8) and convergent validity. A significantly high correlation was found between the MDAS and BDI (Chapter 4 section 4.4.2.2).

5.2.3.4 Sheehan's Disability Scale (SDS)

The Sheehan's Disability Scale (SDS) was included to assess functional impairments of depression due to its critical role in assessment as specified by DSM. In recent years, there has been a growing interest in validating scales that measure the severity of impairment. Sheehan's Disability Scale (SDS) is one of the most widely used disability measures in epidemiological and treatment outcome studies (Sheehan & Sheehan, 2008). It is a three-item self-report instrument in which each item corresponds to a domain of impairment: work, family life/home responsibilities and social/leisure activities and where the impairments are inter-connected. This scale is brief and simple to administer, and can be used as both patient or clinician-rated and it is considered to be advantageous over other scales serving a similar function (Weissmen & Bothwell, 1976). Since its development, it has been tested with adequate reliability and validity (Amin-Esmaeili et al., 2014; Arbuckle et al., 2009; Coles, Coon, DeMuro, McLeod, & Gnanasakthy, 2014). The Chinese version has also been validated with adequate

psychometric performances (Leu et al., 2015). In the present study (N = 234), the Cronbach's alpha co-efficient was 0.84.

5.2.4 Procedure

The recruitment of the pregnant women took place in the waiting room for women's routine antenatal check-up in one of the largest maternity and child hospitals in Inner Mongolia. While in the waiting room before their antenatal check-up, an information pack was handed to women with a consent form, an information sheet, and a sample questionnaire. Those who agreed to take part in the study were asked to sign the consent form. However, if they wished not to reveal their names their consent was implied by handing in the completed questionnaire anonymously. They were given time to complete the questionnaire while in the waiting room after their check-ups. The researcher was present throughout the entire course of the study to answer any questions. Given the fact that difficulty in concentration is a common consequence during pregnancy, there was no time limit for completion of the questionnaires. Ethical approval was granted by the University of Edinburgh and the Antenatal Hospital in Inner Mongolia. The study adopted the same ethical procedure as study 1 and the details can be found in section 4.2.4.

5.2.5 Statistical Analyses

Statistical package SPSS (version 20.0) was used to perform statistical analyses in section (5.3.1-5.3.3), including tests on normality of the data, depression prevalence and assessing the psychometric properties of the MDAS. In results section 5.3.1, descriptive statistics was presented and the normality was investigated using the Shapiro-Wilk test on individual items on the MDAS, total score and subscale score of the MDAS, and score of the BDI and EPDS. For each research question, the detailed data analysis procedure is introduced as following:

1) Research question 1 investigated the prevalence of depression in the current sample. Using a cut-off value of 9/10 on the EPDS, pregnant women scoring at or above 10 were categorized into the depressed group. Prevalence was also examined using the cut-off values of 12 and 16 on the BDI. A detailed discussion of using the particular cut-off values of EPDS was provided in section 3.2.1 and 3.2.2. Moreover, a higher cut-off value as 16 for BDI has been used in many studies and was also used in this study due to the inflated score under the presence of somatic symptoms in BDI (Dennis, 2003).

2) Research question 2 explored the factor structure of the MDAS in pregnant Chinese pregnant women using confirmatory factor analysis (CFA) to compare the model fit of three models: a 3-factor model as yielded in study 1, a 4-factor model based on the original design of the questionnaire, and a 1-factor model. Confirmatory factor analysis was conducted using Mplus version 7 (Muthen & Muthen, 1998-2010), a statistical software package, to examine the underlying dimension structure. It assesses the extent to which observed indicators (items) reflect the hypothesized structure of underlying constructs (factors). CFAs allow the researcher to specify not only how many factors are (theoretically) measured by a given set of items but also, which items function as indicators of which factors (Schumacker & Lomax, 2004). The weighted least square with mean and variance correction estimator (WLSMV) was adopted to test model fit. The estimator gives a robust result when the outcome is categorical and violates multivariate normality. It is also most appropriate in the case of a modest sample size. The hypothesized model was evaluated by multiple fit statistics and criteria for sufficient fit (Bentler & Bonett, 1980) . These included a goodness-of-fit index (GFI); (Joreskog & Sorbom, 1989; study criterion of .90 or higher), the comparative fit index (CFI); Bentler's (1990) study criterion of .90 or higher, and the root mean squared error of approximation (RMSEA); Browne and Cudeck (1989) and Steiger and Lind (1980) study criteria of 0.05 or lower with upper bound no higher than .080. The RMSEA incorporates a penalty function for poor model parsimony (Brown, 2006) and both the CFI and TFI compare the hypothesized model to a more restricted

nested baseline model, the "null model" and represented the incremental fit indices (Brown, 2006; Kline, 2005). There has not been a robust consensus regarding indices of best model fit (Lance, Butts, & Michels, 2006; Marsh, Hau, & Wen, 2004; Ullman, 2006). In general, studies often report model fit of a root-mean-square error of approximation (RMSEA) value of 0.08 or lower (Bentler & Bonett, 1980; Browne & Cudeck, 1993; Tucker & Lewis, 1973) whereas RMSEA below 0.06 indicated a good fit (Harrington, 2009). In the current study, GFI was not reported in model comparison due to contemporary convention (Jomeen & Martin, 2007). The model fit of the three non-nested models were compared of their fit indices in seeking of the best fitting model of MDAS on pregnant Inner Mongolia women.

3) Research question 3 aimed to test the psychometric properties of the Chinese-MDAS on Inner Mongolian pregnant women. The psychometric properties included internal consistency indexed by Cronbach's alpha (α) (Cronbach, 1951) and item-total correlations, and construct validity assessed by Spearman correlation between the MDAS, BDI and EPDS, and SDS. The same procedure was carried out as in study 1 and described in section 4.3.2.

5.3 Results

5.3.1 Descriptive statistics

The distributional properties of each item were looked at by investigating the skewness and kurtosis of the item's distribution (Table 5.2). Given the Likert-type rating scale of the Chinese-MDAS, which contains discrete variables, the item distributions were anticipated to demonstrate certain extend of non-normality. Consistent with this expectation, the Shapiro-Wilk test of normality of all 52 items in MDAS reported a distribution significantly different from normal ($p<.01$). The same result was found in

total scores of the whole MDAS, each subscale, the BDI, and the EPDS (Table 5.3). The evidence for non-normality of the MDAS items as well as the summarizing scores for the whole scale, subscales, BDI and EPDS suggested that normal-theory estimation procedures may not be appropriate for the following data analysis including factor structure of the MDAS and psychometric properties (see Bollen, 1989; Nunnally & Bernstein, 1994).

Table 5.2 Descriptive statistics of the MDAS Item Analysis for pregnant women

MDAS Items	Mean	SD	Skewness	Kurtosis	W (229)	ISC
1 Low mood	.24	.17	1.11	2.41	.77**	.62
2 Sadness	.16	.18	1.70	4.79	.69**	.68
3 Low spirits	.17	.18	1.46	3.35	.73**	.65
4 Gloominess	.14	.17	1.83	5.95	.66**	.66
5 Sad mood	.16	.18	1.64	3.66	.71**	.69
6 Guilt	.14	.17	1.81	5.03	.67**	.59
7 Unhappiness	.19	.19	1.46	3.17	.75**	.63
8 Not cheerful	.21	.18	1.50	3.67	.74**	.64
9 Irritable mood	.25	.19	.90	.93	.83**	.58
10 Dysphoric mood	.23	.19	1.07	2.03	.80**	.65
11 Shame	.08	.15	2.96	13.87	.52**	.59
12 Anxiety	.23	.18	1.11	2.14	.78**	.57
13 Feelings of hopelessness	.06	.13	3.62	19.47	.45**	.63
14 Loss of interest	.13	.17	1.90	5.48	.66**	.70
15 No pleasure	.14	.19	1.55	2.49	.70**	.71
16 The future feels bleak	.12	.18	2.14	5.82	.63**	.67
17 Feeling worthless	.09	.15	2.79	10.81	.54**	.69

MDAS Items	Mean	SD	Skewness	Kurtosis	W (229)	ISC
18 Poor concentration	.21	.18	1.14	2.06	.78**	.66
19 Self-blame	.15	.17	1.52	3.37	.70**	.58
20 Life feels meaningless	.09	.16	2.72	9.91	.55**	.61
21 Feeling a failure	.11	.16	2.36	7.90	.60**	.62
22 Ruminations	.15	.18	1.47	2.59	.72**	.61
23 Thoughts of suicide	.02	.08	7.77	78.86	.20**	.50
24 Unable to make decision	.21	.19	1.08	1.31	.78**	.54
25 Low energy	.21	.19	1.20	1.89	.78**	.42
26 Problems with sleeping	.26	.20	.98	1.13	.83**	.44
27 Change in appetite	.23	.20	1.01	1.01	.81**	.67
28 Lower sex drive	.28	.21	1.00	.59	.83**	.60
29 Feel slowed down	.18	.19	1.32	1.63	.75**	.55
30 Fatigue	.31	.19	.76	.36	.85**	.34
31 Change in weight	.32	.20	.56	-.19	.88**	.49
32 Crying	.20	.18	1.08	1.61	.77**	.44
33 Agitation	.20	.18	1.08	1.52	.77**	.51
34 Slowed movement	.23	.20	1.12	1.23	.81**	.48
35 More pain sensitivity	.21	.20	1.12	1.09	.80**	.19
36 Intestinal problems	.21	.21	1.16	.93	.79**	.62
37 Decrease in activities	.24	.21	.99	.60	.82**	.67
38 Social withdrawal	.22	.22	1.19	.77	.79**	.54
39 Feeling worse than others	.12	.17	2.03	5.35	.65**	.50

MDAS Items	Mean	SD	Skewness	Kurtosis	W (229)	ISC
40 Feel a burden on others	.07	.14	2.80	10.90	.52**	.52
41 Social avoidance	.15	.19	1.54	2.30	.71**	.40
42 Feeling undeserving of others care	.04	.12	3.81	18.29	.38**	.41
43 Hypersensitive to criticism	.19	.20	1.35	1.94	.76**	.58
44 Feeling less attractive than others	.15	.19	1.77	3.77	.70**	.53
45 Feel too sensitive to others	.24	.21	1.03	.77	.82**	.44
46 Feeling let down by others	.19	.19	1.27	1.99	.77**	.58
47 Unable to love others	.07	.14	2.63	10.88	.52**	.56
48 Aggression towards others	.07	.15	3.24	13.05	.48**	.46
49 Poor Memory	.26	.19	.69	.23	.84**	.57
50 Unable to plan things	.16	.19	1.54	2.77	.72**	.58
51 Feeling disorganized	.15	.19	1.75	3.90	.70**	.37
52 Unable to care for myself	.09	.16	2.77	10.63	.55**	.60

Note. N =234; W = Shapiro–Wilk test of normality; ISC = Corrected Item-total correlation; **$p < .01$.

Table 5.3 Shapiro-Wilk Test of normality of MDAS, subscales, EPDS and BDI

Total Scores	Descriptive Statistics				
	Mean	S.D	Min	Max	W
MDAS total score	85.90	23.05	55	232	.86**
Emotional subscale	20.06	6.75	12	60	.83**
Cognitive subscale	23.95	7.41	16	72	.83**
Somatic subscale	23.06	6.60	12	48	.95**
Interpersonal subscale	18.83	5.78	11	52	.88**
BDI	8.09	6.32	0	37	.87**
EPDS	8.00	4.72	0	26	.96**
SDS	3.08	5.05	0	30	.67**

W = Shapiro–Wilk test of normality **p<.01

5.3.2 Research question 1: Prevalence of depression

Table 5.4 shows the prevalence of depressed women according to the BDI and the EPDS based on various cut-off values. Using a cut-off value of 16 for the BDI, 10% of women scored above the cut-off value. On the other hand, 15% of women scored above 13 on the EPDS while 36% scored above 10, indicating that they were in a higher risk group for developing depression.

Table 5.4 Prevalence of depression based on different cut-off values of the BDI and EPDS

Scale	Cut-off	Prevalence (%)
BDI total score	15/16	25 (10.3%)
EPDS total score	12/13	35 (15.0%)
EPDS total score	9/10	85 (36.3%)

5.3.3 Research question 2: Comparison of the three models of the Chinese-MDAS

5.3.4.1 Factor structure for the MDAS

The CFA model of the 3-factor structure obtained from study 1 failed to support the three-factor structure that the model converged abnormally, due to two highly correlated factors of factor 2 and 3. As a remedy, factor 2 and 3 were combined into a new factor to eliminate this problem. Hence the resulting 2-factor model was compared in this section with the hypothetical 4-factor model and the 1-factor model.

The CFA model fit of the three models shows significant chi square differences ($p<0.01$), suggesting that all three models have unexplained variances. However, as Browne and Cudeck (1992) have postulated, it is unrealistic to anticipate a perfect-fit model between hypothesized and observed data. In addition, statistically significant χ^2 difference could also be the result of sample size and small variations in the data (Hu and Bentler, 1984). As a result, a significant chi-square difference yielded in CFA models is generally accepted. Rather, they suggested that the root mean square error of approximation (RMSEA) to be a more realistic fit index than chi-square statistics (Browne & Cudeck, 1992). Table 5.5-5.8 shows the comparison of fit indices of the three models. The factor loadings of the 4-factor model is shown in table 5.6. The 2-factor model is shown in table 5.7, whereas table 5.8 shows the factor loadings of the 1-factor model. All of them showed similarly good indices of CFI and TFI (>0.95). However, statistics of the RMSEA indicated that the 4-factor model and 1-factor model are a better fit to the current data and the 2-factor model established from EFA in study 1 showed a less good fit. The RMSEA of both the 4-factor and 1-factor models were less than 0.08, whereas that of the 3-factor model was close to 0.1. The result also presents factor loadings for each item on all models (shown in table 5.7 with standardized factor loadings for each model tested).

Table 5.5 Confirmatory factor analysis model fit indices

Fit indices	4 factor model	2 factor model	1 factor model
Chi square,	3864.03	3887.44	5075.17
(df)	1268	776	1274
P	0.00	0.00	0.00
RMSEA,	0.068	0.095	0.082
(90% CI),	0.065-0.070	0.092-0.098	0.080-0.084
P RMSEA <=0.05	0.00	0.00	0.00
CFI	0.97	0.95	0.95
TFI	0.96	0.95	0.95

Table 5.6 Standardized (STDYX) factor loadings of the four-factor model

	Four-factor hypothesized model			
Item	**Emotional factor**	**Cognitive factor**	**Somatic factor**	**Interpersonal factor**
1 Low mood	0.90			
2 Sadness	0.58			
3 Low spirits	0.90			
4 Gloominess	0.90			
5 Sad mood	0.91			
6 Guilt	0.93			
7 Unhappiness	0.95			
8 Not cheerful	0.78			
9 Irritable mood	0.94			
10 Dysphoric mood	0.94			
11 Shame	0.64			

	Four-factor hypothesized model			
Item	**Emotional factor**	**Cognitive factor**	**Somatic factor**	**Interpersonal factor**
12 Anxiety	0.81			
13 Feelings of hopelessness		0.65		
14 Loss of interest		0.69		
15 No pleasure		0.90		
16 The future feels bleak		0.92		
17 Feeling worthless		0.92		
18 Poor concentration		0.90		
19 Self-blame		0.89		
20 Life feels meaningless		0.82		
21 Feeling a failure		0.85		
22 Ruminations		0.90		
23 Thoughts of suicide		0.90		
24 Unable to make decision		0.84		
49 Poor Memory		0.76		
50 Unable to plan things		0.70		
51 Feeling disorganized		0.62		
52 Unable to care for myself		0.75		
25 Low energy			0.90	
26 Problems with sleeping			0.76	
27 Change in appetite			0.86	
28 Lower sex drive			0.70	
29 Feel slowed down			0.70	
30 Fatigue			0.63	
31 Change in weight			0.80	

	Four-factor hypothesized model			
Item	**Emotional factor**	**Cognitive factor**	**Somatic factor**	**Interpersonal factor**
32 Crying			0.77	
33 Agitation			0.34	
34 Slowed movement			0.68	
35 More pain sensitivity			0.84	
36 Intestinal problems			0.72	
37 Decrease in activities				0.54
38 Social withdrawal				0.63
39 Feeling worse than others				0.75
40 Feel a burden on others				0.77
41 Social avoidance				0.92
42 Feeling undeserving of others care				0.92
43 Hypersensitive to criticism				0.84
44 Feeling less attractive than others				0.91
45 Feel too sensitive to others				0.79
46 Feeling let down by others				0.77
47 Unable to love others				0.73
48 Aggression towards others				0.71

Table 5.7 Standardized (STDYX) factor loadings of the two-factor model

	Three-factor model from study 1	
Item	**Combined factor**	**Cognitive interpersonal factor** **Somatic factor**
1 Low mood	0.87	
3 Low spirits	0.56	
4 Gloominess	0.88	
5 Sad mood	0.87	
7 Unhappiness	0.91	
8 Not cheerful	0.93	
10 Dysphoric mood	0.94	
12 Anxiety	0.61	
14 Loss of interest	0.79	
15 No pleasure	0.63	
18 Poor concentration	0.68	
26 Problems with sleeping	0.89	
41 Social avoidance	0.77	
6 Guilt		0.90
9 Irritable mood		0.75
11 Shame		0.94
19 Self-blame		0.89
21 Feeling a failure		0.91
22 Ruminations		0.92
32 Crying		0.82
39 Feeling worse than others		0.68

	Three-factor model from study 1	
Item	**Combined factor**	**Cognitive interpersonal factor** **Somatic factor**
40 Feel a burden on others		0.59
42 Feeling undeserving of others care		0.74
43 Hypersensitive to criticism		0.32
44 Feeling less attractive than others		0.64
45 Feel too sensitive to others		0.80
46 Feeling let down by others		0.69
48 Aggression towards others		0.50
24 Unable to make decision		0.89
27 Change in appetite		0.81
28 Lower sex drive		0.83
29 Feel slowed down		0.89
31 Change in weight		0.88
34 Slowed movement		0.84
35 More pain sensitivity		0.71
36 Intestinal problems		0.82
37 Decrease in activities		0.67
49 Poor memory		0.59
50 Unable to plan things		0.70
51 Feeling disorganized		0.71
52 Unable to care for myself		0.82

Table 5.8 Standardized (STDYX) factor loadings of the one-factor model

Item	One-factor model
	Depression
1 Low mood	0.86
2 Sadness	0.55
3 Low spirits	0.87
4 Gloominess	0.86
5 Sad mood	0.88
6 Guilt	0.90
7 Unhappiness	0.92
8 Not cheerful	0.75
9 Irritable mood	0.93
10 Dysphoric mood	0.92
11 Shame	0.61
12 Anxiety	0.78
13 Feelings of hopelessness	0.64
14 Loss of interest	0.68
15 No pleasure	0.88
16 The future feels bleak	0.91
17 Feeling worthless	0.91
18 Poor concentration	0.89
19 Self-blame	0.88
20 Life feels meaningless	0.81

Item	One-factor model
	Depression
21 Feeling a failure	0.83
22 Ruminations	0.89
23 Thoughts of suicide	0.88
24 Unable to make decision	0.82
25 Low energy	0.84
26 Problems with sleeping	0.72
27 Change in appetite	0.81
28 Lower sex drive	0.66
29 Feel slowed down	0.67
30 Fatigue	0.60
31 Change in weight	0.76
32 Crying	0.73
33 Agitation	0.32
34 Slowed movement	0.64
35 More pain sensitivity	0.79
36 Intestinal problems	0.68
37 Decrease in activities	0.50
38 Social withdrawal	0.59
39 Feeling worse than others	0.70
40 Feel a burden on others	0.73
41 Social avoidance	0.86

Item	One-factor model
	Depression
42 Feeling undeserving of others care	0.86
43 Hypersensitive to criticism	0.79
44 Feeling less attractive than others	0.86
45 Feel too sensitive to others	0.74
46 Feeling let down by others	0.72
47 Unable to love others	0.69
48 Aggression towards others	0.67
49 Poor Memory	0.74
50 Unable to plan things	0.68
51 Feeling disorganized	0.61
52 Unable to care for myself	0.74

5.3.4 Research question 3: Psychometric properties of the Chinese-MDAS

5.3.4.1 Internal consistency and group discrimination

The overall Cronbach's alpha for the whole MDAS was .96 with a mean inter-item correlation of .33 (range = –.08 to +.86). Cronbach's alpha estimates for the four subscales of the Chinese-MDAS ranged from .84 to .93 (Emotional, α = .93; Cognitive, α = .91; Somatic, α = .85; Interpersonal, α = .84). Based on the criterion of .30 as an acceptable corrected item–total correlation (Nunnally & Bernstein, 1994), only one item, item 35 showed an item-total correlation lower than the criterion. However, it was retained due to two considerations: 1) Its importance in content and 2) its high

factor loadings in factor analysis in table 5.7.

5.3.4.2 Convergent validity

Spearman correlations showed significant positive correlations in a range from .44 to .59 between the MDAS, each subscale, the EPDS and the BDI. As expected, the MDAS and all the four subscales showed a significant positive and moderate correlation with the BDI and EPDS. In addition, a significant correlation ($r = 0.28$, $p<0.01$) was found between the MDAS and Sheehan's Disability Scale. The convergent validity represents the correlation between the New Multidimensional Depression Scale with the EPDS and BDI (Table 5.5).

Table 5.9 Spearman Correlation Matrix of MDAS, BDI and EPDS

Measures	BDI	EPDS
MDAS	0.59**	0.56**
Emotional Subscale	0.44**	0.54**
Cognitive subscale	0.54**	0.58**
Somatic subscale	0.52**	0.37**
Interpersonal subscale	0.47**	0.42**

**p<0.01

5.4 Discussion

This chapter has presented study 2, which investigated the psychometric characteristics of the MDAS on Inner Mongolian pregnant women and presented the findings on the prevalence and symptom patterns. To date, it is the first study to examine depression in an Inner Mongolian pregnant sample. This study is also the first to examine symptom patterns in Inner Mongolian pregnant women. The following sections discuss the findings in relation to each research question.

5.4.1 Research question 1: Prevalence of antenatal depression in Inner Mongolian pregnant women

Using the EPDS cut-off value of 9/10, a prevalence rate of 35% was found. This figure is consistent with the findings in previous studies using cut-off values for the EPDS. On Chinese samples, for example, Lau et al. (2011) reported a prevalence rate of 35.9% for mild to severe antenatal depression and 7.3% for severe antenatal depression. Similarly, 28.5% was reported in Zeng et al's (2015) study. Li and colleagues (2012) reported that 39% of women scored above 9.5 on the EPDS to indicate signifying depression, among whom 36.4% were in their first trimester, 40.2% were in their second trimester and 39.8% were in their third trimester. A similar figure was also reported in the study by Leung and Kaplan (2009). The variations on reported prevalence of antenatal depression in Chinese populations could be due to the use of different diagnostic tools (self-report instruments vs. clinical interview), different cut-off values of self-report instruments and the timing of the assessment. The current study reported a comparable prevalence rate of depression with studies using EPDS and with studies on third trimester. On the other side, a much lower prevalence rate was recorded by Lee et al. (2004) of 6.4% using structured clinical interviews for DSM-IV (SCID-NP). Possible reasons for the higher prevalence of using self-report measures could be due to inflated scale score due to the presence of somatic symptoms. Moreover, somatic symptoms could also be amplified by depression (Kelly et al.,

2001). For instance, Yilmaz et al. (2016) reported significant association between severe nausea and vomiting and greater depressive symptom severity in pregnant adolescents. In this study, the majority of participants was in their third trimester (>90%) and could experience many somatic symptoms due to their pregnancy. However, although MDAS could give rise to false positives due to its somatic symptoms, its holistic approach in presenting symptoms in various dimensions allows opportunity for the pregnant women to clarify the aspect of symptoms they experience through scores in each subscale. In addition, using valid and reliable self-report instruments as screening tools is advantageous in primary care especially in low resources settings (Chorwe-Sungani & Chipps, 2017). Further investigation on developing sensitivity and specificity of MDAS on Chinese pregnant women is needed.

5.4.2 Research question 2: Comparison of factor models of the MDAS for pregnant women in Inner Mongolia

Presented in the results section in 5.3.4, a comparison of three models for the pregnant sample revealed that the originally designed 4-factor model had better model fit indices than the 3-factor model developed from the clinically depressed sample in study 1 or a 1-factor model. In other words, despite a 3-factor model emerging from EFA in study 1, it is not superior to the 4-factor model and the 1-factor model in CFA on this sample of participants. In addition, each factor in the 3-factor model contains symptoms from various dimensions of depressive symptoms. A mixture of emotional, cognitive, somatic and interpersonal factors emerged in each factor in the 3-factor model obtained in study 1 made the model less interpretable than the theory-driven 4-factor model. Therefore, the 4-factor model has the advantage of being more parsimonious, with each factor containing a clear dimension of depressive symptoms. This is consistent with the theory on which the MDAS was based during its development.

This result supported using the total score of the MDAS in Inner Mongolian pregnant women to indicate severity of depression and using the 4 subscales to assess depressive symptoms in each dimension. Locating the best model fit has important clinical implications. In particular, this is the first study to validate self-report instruments and the first to investigate the factor structure of the MDAS with Inner Mongolian pregnant women. The result of the study implied suitability of the MDAS to measure depressive symptoms in pregnant women using a multidimensional scale. It also supported that the somatic subscale, which has been the centre of controversy for depression screening in pregnant women, should be reconsidered before ruling out from self-report instruments. Indeed, somatic factors have emerged in the factor structure of many self-rating depression scales. For example, Yonkers, Smith, Gotman, and Belanger (2009) extracted a strong somatic factor from their EFA of the PHQ-9, which explained 40% of the total variance, suggesting its predominant role in early pregnancy. In addition, inclusion of an interpersonal subscale, which fits the cultural characteristics of Chinese populations, is also supported.

The factor analytic study in this chapter helped to highlight the nature of depression during pregnancy for Inner Mongolian pregnant women and has untangled the cluster of depressive symptoms masked by somatic complaints during pregnancy (Bos et al., 2009). A best fit 4-factor model in CFA suggest that the depression symptom profile among Inner Mongolian pregnant women is consistent with the theoretical descriptions of the presence of all four dimensions of depressive symptoms. The similar satisfactory model fit found for UK and Hong Kong Chinese samples (Cheung & Power, 2012) leads to the possibility that depressive symptoms manifest in a similar way across culture both during and outwith pregnancy. Support of the theory-driven model of depression on pregnant sample is partly consistent with the latest revision of DSM-5 that perinatal depression presents similar clinical characteristics to depression that occurs at any time of life (APA, 2013). The UK National Institute for Clinical Excellence Institute (National Institute of Clinical Excellence (NICE), 2004) had also specified that the symptoms of perinatal depression were similar as in other periods of women's lives (low mood and losing enjoyment, anxiety, sleep disruption and disturbed eating patterns, poor concentration, low self-esteem, low energy levels, and

loss of libido). However, the model fit of the one-factor model and the two-factor model marginally exceeded 0.08 criteria though equally high CFI and TFI were obtained. Further investigation of factor structure of MDAS is needed on pregnant women in China with a larger sample size in searching of the best-fit model.

Another importance issue regarding the results of study 2 is the good stability of the MDAS. Maintaining the same factor structure across populations facilitates development of matrix invariance and the ability of the MDAS score to reflect the severity of depression. In chapter 3, the currently used self-report instruments especially the EPDS were criticized because of unstable factor structure across populations. In this study, the MDAS is found to be suitable for assessing depression using all four subscales and the total score of the scale as an indication of symptom severity. Yet more studies in the future are needed to address the nature and symptoms of antenatal depression in China and gain more insight into the nature of depression across cultures.

5.4.3 Research question 3: Assessing antenatal depression with the Chinese-MDAS

Following the result of a best-fit 4-factor model of the MDAS, the psychometric characteristics of the Chinese-MDAS points to a possibility of adopting a multidimensional symptomatic scale for pregnant samples in Inner Mongolia and other parts of China. In particular, a high internal consistency was found for the Chinese-MDAS and each subscale. A significant positive correlation was also found between the Chinese-MDAS, BDI and EPDS, suggesting a good convergent validity of the new scale with standardized and well-studied scales. Among the correlations between MDAS subscales and the BDI and EPDS, a large effect size ($r>0.5$) was found between MDAS total score, BDI and EPDS, MDAS emotional subscale and EPDS, MDAS cognitive subscale and BDI and EPDS, MDAS somatic subscale and BDI. The smallest effect size was found between the MDAS somatic subscale and EPDS. This

is in line with the prediction, as the EPDS was designed to eliminate most of the somatic symptoms. The effect size between the interpersonal subscale and both the BDI and EPDS was close to but less than 0.5. This could be due to the fact that both of these existing scales do not include comprehensive items to assess interpersonal symptoms of depression. A significant correlation between the MDAS and the SDS suggested its ability in indicating impairment. This is likely due to the interpersonal symptoms that are usually present in measures to measure depressive symptom severity. In terms of dimensionality, confirmatory factor analysis (CFA) provided evidence for a moderately good fit of a four-factor model on the MDAS for pregnant women. The result suggested that using the four-subscale Chinese-MDAS demonstrated that satisfactory psychometric characteristics could be obtained with a pregnant population in China. In fact, researchers such as Nylen, Williamson, O'Hara, Watson, and Engeldinger (2013) opposed taking out somatic symptoms in self-report instruments when assessing antenatal depression. It could lead to reduced scale validity as the assessment does not fully reflect how severe pregnant women's mood disturbance is.

Indeed, as reviewed in Chapter 3, depression assessment scales that put considerable weight on physical symptoms of depression, such as the PHQ-9 and GHQ, have been used with pregnant women and shown sufficient psychometric performance. The question of whether somatic symptoms should be included in assessment for antenatal depression has long been debated. Somatic symptoms such as change in weight, fatigue, and lower sex drive were consistent with the natural consequence of pregnancy. As a result, inclusion of a full somatic subscale could impose potential problems in assessing antenatal depression, including false positive screening, and thus it needs further investigation. Psychological symptoms such as irritable mood, poor memory and low mood, though also experienced by non-depressed pregnant women, are often considered to be the most crucial items to differentiate between depressed and non-depressed pregnant women. In fact, symptoms such as hopelessness, irritability, emotional liability, tearfulness, fatigue, psychomotor agitation, guilt and/or feelings of inadequacy have been suggested as valid indicators in the specification of antenatal

depression (O'hara & Swain, 1996). Indeed, greater caution and further investigation is required into the somatic sub-scale before it can be directly applied to pregnant samples, in order to avoid false positives of depression diagnosis.

5.5 Chapter summary

This chapter has discussed the use of the Chinese-MDAS on pregnant Chinese women in Inner Mongolia. It has presented a study that examined its psychometric characteristics and depressive symptom profile through factor analysis. It pointed to the possibility of using the MDAS for clinical use in a pregnant population in China. Good psychometric properties were revealed in terms of reliability, validity and dimensionality. The result of 4-four factor model best fitting pregnant Inner Mongolia women supported the hypothesis that interpersonal relationships are important in collective societies. In the next chapter, interpersonal functioning and social support during pregnancies of Chinese women will be further explored.

CHAPTER SIX

RISK FACTORS OF DEPRESSION DURING PREGNANCY IN INNER MONGOLIA

6.1 Introduction

In studies 1 and 2 the psychometric characteristics of the Chinese-MDAS were investigated in non-pregnant and pregnant samples in Inner Mongolia. The symptom pattern of depression was investigated through the factor structure of the Chinese-MDAS. In line with previous studies regarding the symptom structure of depressed individuals, interpersonal symptoms were extracted as a significant, albeit weaker, factor on MDAS in clinically depressed sample. A best-fit four-factor model in study 2 supported using MDAS on Chinese pregnant women in its four-subscale form. As reviewed in Chapters 1 and 2, interpersonal symptoms relate to self-awareness and relationships with others, which are valued in Chinese culture. The results hence suggested the possibility that Chinese pregnant women might experience interpersonal symptoms such as a negative interpersonal relationships as an important part of depression.

The risk factors for antenatal depression have been extensively studied in Western literature (Lancaster et al., 2010). They have also been shown to be applicable to Chinese pregnant populations (e.g. Shi et al., 2007). Reported in many studies, such as that by Schatz et al. (2012) in their review of antenatal depression in East Asia (e.g. Taiwan, China (including Hong Kong and Macau, Japan, and Korea), Chinese individuals have common risk factors associated with antenatal depression in both Western and Eastern populations, including: age (Qiao et al., 2009; Zhao et al., 2014), education level (Qiao et al., 2009; Zhao et al., 2014), occupation, number of miscarriages/abortions (Li et al., 2012), irregular menstrual history (Li et al., 2012), and age at first pregnancy, which all had moderate associations with antenatal

depression, unsatisfying living conditions, a poor relationship with mother-in-law, unplanned pregnancy (Zhao et al., 2014), and relationship with husband (Loo et al., 2010).

However, there is a relative paucity of studies focusing on antenatal depression and risk factors for it in mainland Chinese populations (Lau, Yin, & Wang, 2011; Zeng, Cui, & Li, 2015), let alone Inner Mongolian pregnant women. Increasing attention has been given to the risk factors for antenatal depression across cultures (Glasser, Hadad, Bina, Boyko, & Magnezi, 2016). Chapters 1 and 2 have given a detailed picture of the Chinese Confucian heritage that works to place great importance on interpersonal relatedness and relationships, especially the relationship with family members. In addition, Chinese women face a higher unemployment rate, and longer waiting time to get re-employed than men (Ding, Dong, & Li, 2009; Du & Dong, 2008). At the same time, they have had to pay for more expensive childcare following welfare reforms. Tension also arises between the Confucian value of female submissiveness and the socialist ideology that women should contribute to the financial income of the family. All these factors could lead to increasing challenges for Chinese pregnant women in maintaining a work-life balance. In particular, they are under the combined stress of having less security in employment, the traditional gender role of taking care of the family, pressure as a dual earner, interpersonal stressors in family dynamics, the birth-control policy, and the anxiety about producing a male heir (reviewed in chapter 2).

Indeed, it is likely that endorsing culturally sensitive risk factors in different countries is the reason for different expressions of depression across nations (Evagorou, Arvaniti, & Samakouri, 2016). Social surroundings have been shown to relate to the occurrence of disease (Callister, Beckstrand, & Corbett, 2010). It could therefore lead to the questioning of whether the risk factors in the previously reviewed literature could also be applied to Inner Mongolian pregnant women. Study 3 in this chapter focuses on

two sets of risk factors: well-studied risk factors including age, education, occupation, previous history of abortion, gestation week, social support, and self-esteem; and the context-specific risk factors which have been demonstrated to be associated with depression in non-pregnant populations and other pregnant cultural groups. These are: work stress, work-family conflict, and social activities.

Many risk factors in the current study have been less examined in Chinese populations and have never been studied in Inner Mongolian pregnant women. For example, self-esteem has been demonstrated among Western populations to be associated with depressive symptoms during the later stages of gestation (Cameron, Grabill, Lavin, & Hobfoll, 1996; Jomeen & Martin, 2005b); Wang, Jiang, Jan, and Chen (2003) reported that self-esteem was a significant predictor of postnatal depression for Taiwanese and Mainland Chinese women. However, this association has been less studied in Chinese pregnant populations. In the study by Loo et al. (2010), poor self-esteem was found to be associated with prenatal anxiety, rather than prenatal depression. In terms of work stress, a combined effect of high job demand and low control over the conditions of work, referred to as job strain, has been shown to lead to psychological stress among women (Virtanen et al., 2008). This relationship has been replicated across populations (Lopes, Araya, Werneck, Chor, & Faerstein, 2010; Santavirta, Solovieva, & Theorell, 2007). However, the relationship between work stress and antenatal depression has yet to be examined with Mainland Chinese pregnant women. Some studies (Okechukwu, Ayadi, Tamers, Sabbath, & Berkman, 2012; Wang, Lesage, Schmitz, & Drapeau, 2008) also reported that imbalance between work and family life remains the strongest factor to link to mental disorder. In addition, cultural differences in social support are found in terms of its nature and quality (Glazer, 2006). The investigation carried out on Chinese populations has been focused particularly on the elderly and less attention has been given to pregnant women. Lau et al. (2011) reported a significant association between social support and depressive symptoms in Chengdu pregnant women. More work is needed across populations in China. A study conducted on a perinatal cohort of women in their third trimester (N=730) in urban and rural Turkey documented that a more profound relationship was found between antenatal depression and worsening

partner relationship in the traditional family than in nuclear families (Senturk, Abas, Dewey, Berksun, & Stewart, 2017). Finally, previous literature on the relationship between activities and antenatal depression mainly focused on physical activities (McEachan et al., 2015; Moraes, Campos, & Avelino, 2016). Bavle et al. (2016) reported significant correlation between EPDS and social life on Indian pregnant women. However, insufficient evidence has been presented on the role of social activities on Chinese pregnant women. As a result, study 3 presented in this chapter aims to address the knowledge gap of whether depressed and non-depressed pregnant women in Inner Mongolia differ in general demographic factors and hypothesized factors related to their culture and social environment.

6.1.2 The present study

This study examines risk factors that are theoretically assumed to be associated with antenatal depression in Chinese cultures as well as those that have previously been reported in other cultural groups (Koleva et al., 2011). Specifically, this study examined risk factors in relation to occupational stress and work-life balance. It also examines social functioning, social activities and self-esteem. Finally, socio-economic risk factors including age, gestation week, first pregnancy, education attainment, labour market position, and occupation were also investigated. Based on the best-fit model of a four-factor structure corresponding to each subscale (chapter 5), the dependent variables were the total score of the MDAS and the score of each subscale in the MDAS. The independent variables included socio-economic factors, work-related factors, and social functioning and self-awareness. The social functioning subscale (see section 6.3.8) contains a number of activities that could be categorized by their nature. For example, activities such as going to the cinema or an exhibition tend to be done alone, while activities such as meeting or visiting friends and relatives are more interpersonal-oriented. Hence, to benefit the later regression analyses in finding out which type of activities were more likely to be associated with depression, factor analysis was conducted on the scale. Using this method, activities that were

highly correlated were grouped under the same factor. This approach explored the underlying dimensions and could provide more information regarding the relationship between social activities and depressive symptoms. It is hypothesised that interpersonal-related activities were more important contributors to depressive symptom in Chinese pregnant women. A similar approach was used for work stress survey (section 6.3.6). Rather than examining the severity of work pressure in terms of a sum score of work stress, the work stress scale was reduced with factor analysis to several dimensions with conceptually similar items. This provided more information regarding aspects of work stress that could be related to depressive symptoms during pregnancy.

In this study the research question is explored through three levels of data analyses. In the first level, the same group of pregnant women in Inner Mongolia as in chapter 5 were categorized into a depressed group and a non-depressed group using a cut-off value of EPDS 9/10 established in previous validation studies of various populations. The aim for this analysis was to examine how depressed and non-depressed pregnant women differ in demographic and psychosocial risk factors based on a well-established categorization. The cut-off value of EPDS 9/10 has given rise to high specificity and sensitivity in Chinese population (Lee et al., 2000). Categorizing the pregnant sample in this study based on this cut-off value could yield understanding of the group difference on each demographic and psychosocial risk factor. However, the method of group comparison is subjected contained less information on depressive severity than on a continuous spectrum due to collapsing categories in group comparison analysis. Multiple linear regression could gain more insights on its association with risk factors using the continuous spectrum of depressive severity. In the second level, bivariate relationships were examined between MDAS, EPDS, BDI and psychosocial risk factors. This level of analysis served two purposes. First, a significant correlation between MDAS and psychosocial scales pointed to their possibility as risk factors and thus enabled them to be further investigated in regression model. In the third level of analysis was a multivariate analysis to investigate the relationship between multiple independent variables and more than one outcome

variables (MDAS and each subscale). Therefore, the hierarchical multiple linear regression models simultaneously examined the relationships between depressive symptoms and multiple psychosocial variables, controlling for demographic variables. All of the potentially important psychosocial risk factors could be accounted for in one model. It has the advantage of understanding how all of the factors as a whole is associated with the outcome variables (depressive symptoms as a whole and in each dimension). It also helps understand how each individual factor is associated with the outcome variable (Marill, 2004).

Three research questions are addressed:

1. How do depressed and non-depressed pregnant women differ in terms of demographic factors (maternal age, gestation week, and first pregnancy, and abortion history, level of education, employment status, occupation, and hours of work per week)?

   Hypothesis: Depressed pregnant women were hypothesised to be younger, less educated, unemployed or in their first pregnancy. They were also hypothesised to be in a more advanced gestation week, and to work more outside of the home.

2. What are the relationships between depressive symptoms and psychosocial variables including self-esteem, social support, social activity, work-family and family-work conflict, and work stress?

   Hypothesis: A significant relationship is expected to be found between total score of MDAS and scores of its subscales with psychosocial scales including SES, WSS, WFS, FWS, SOS and SFS.

3. How do all the psychosocial risk factors predict depression symptoms when demographic variables are controlled for? In particular, are the underlying

dimensions of work stress and social activity significant predictors in the model?

Hypothesis: Psychosocial risk factors of self-esteem, job stress, work-and-family conflict, social support and social activities were hypothesised to be significant predictors in hierarchical linear multiple regression models.

6.2 Methods

6.2.1 Design

The research design was exploratory, cross-sectional, and quantitative. Bivariate and multivariate relationships between risk factors and depressive symptoms were examined.

6.2.2 Participants

The same sample of pregnant Chinese women (N = 234) in Inner Mongolia as described in Chapter 5 was studied. For the detailed sample description please refer to section 5.2.2.

6.3 Measures

6.3.1 The Edinburgh Postnatal Depression Scale (EPDS)

The Edinburgh Postnatal Depression Scale (EPDS) (Cox et al., 1987) was used in this study with two purposes: 1) to screen for antenatal depressive symptoms and identify case-positive and negative pregnant women with a cut-off value of 10; 2) to assess the severity of depressive symptoms in the sample. A detailed explanation of the EPDS

can be found in Chapter 5 (Section 5.3.2) and detailed reviewed of EPDS involving the rationale to use it in this study could be found in Chapter 3 (section 3.2.1). In the present study (N = 234), the Cronbach's alpha co-efficient was 0.83.

6.3.2 Beck Depressive Inventory (BDI)

The BDI used in this study is the same as in chapters 4 and 5. A detailed explanation can be found in Chapter 4 (Section 4.2.6) and Chapter 5 (section 5.3.1). In the present study (N = 234), the Cronbach's alpha co-efficient was 0.85.

6.3.3 Chinese-Multidimensional Depression Assessment Scale (Chinese-MDAS)

The MDAS was validated on a clinical Chinese sample (section 4.5) and Chinese pregnant women (chapter 5 section 5.5) and was demonstrated to have good psychometric properties in both samples.

Measures for psychosocial risk factors

Various self-report instruments will be introduced in the following sections (6.3.4-6.3.9) to measure the psychosocial risk factors introduced in section 6.1 for the present study.

6.3.4 Rosenberg Self-Esteem Scale (SES)

The Rosenberg Self-Esteem Scale (SES) (Rosenberg, 1965) is a widely used measure of self-esteem. The ten items are rated on a 4-point Likert scale from strongly agree to strongly disagree. Half of the scale is positively worded and half negatively worded. Total scores range from 10 (lowest self-esteem) to 40 (highest self-esteem). The SES has been widely validated (Martin-Albo, Nunez, Navarro, & Grijalvo, 2007) and reported to have internal consistency and split-half reliability above 0.7 (see the review by Tian, 2006). Validity between SES and other scales such as the General Health Questionnaire (GHQ-30 and GHQ-20) are reported to be 0.57 and 0.54 respectively. It has been validated in the Chinese language and has widely been used in Chinese society in research into self-esteem (Liang & Zhang, 2014). In the present study (N = 234), the Cronbach's alpha co-efficient was 0.71.

6.3.5 Work Stress Survey (WSS)

The work stress survey is a 10-item brief self-rating questionnaire developed by the American Institute of Stress (The American Institute of Stress, 2011). It includes items on job strain, effort-reward imbalance and work-family conflicts, which are shown to be associated with depression (Wang, et al., 2012). Considering the common pregnancy complaint of difficulty in concentration, a brief scale containing necessary elements of work stress is more appropriate. Respondents rated each item on a 4-point scale. The English version of the scale was translated into Chinese by the author based on the same method as described in chapter 4 (section 4.2.7). It demonstrated an adequate Cronbach's alpha (0. 738) on this Chinese pregnant sample. Factor analysis was conducted on the scale with the pregnant sample in this study to investigate the underlying structure of the scale and presented in section 6.5.3. This provides more insight into the component of work stress that is related to depression during pregnancy in a Chinese sample.

6.3.6 Work-Family Conflict (WFC) and Family-Work Conflict Scale (FWC)

Developed by Netemeyer, Boles, and McMurrian (1996), the measure includes the 5-item Work-Family conflict scale and the 5-item Family-Work conflict scale. The two scales measured the degree of incompatibility of role responsibility for work and family. In particular, fulfilment of one role made the other difficult to perform (Katz & Kahn, 1978). Regarding work-family perspective, conflicts arise when work and family domains are incompatible-engagement in work hinders one's participation in family life (Greenhaus & Beutell, 1985). WFC measured the inter-role conflict between work and family in which the general demands of time devoted to, and strain created by the job hinders individuals from carrying out family-related responsibilities, while FWC measured the conflict in the reverse direction. Validation of the two scales reported an average alpha of 0.88 for WFC, and of 0.86 for FWC across three samples, suggesting a high internal consistency (Netemyer et al., 1996). In terms of dimensionality, a two-model structure was found to best fit the data. The scales have not been used in a Chinese context and thus they were translated based on the same method as described in section 4.2.7. A Cronbach's alpha of 0.86 was found for the WFC and of 0.91 for the FWC in the pregnant Chinese sample for this study.

6.3.7 Sub-scale of Social Functioning Scale (SFS subscale)

The Social Functioning Scale (SFS) was developed by Birchwood, Smith, Cochrane, Wetton, and Copestake (1990) with the original intention of capturing social performance and functioning in schizophrenia patients. It contained several components. In this study a subscale was used which consisted of 22 social events. Participants rated the frequency of their taking part in the activities on a four-point scale from 'Never' to 'Often'. Adequate validity, reliability and sensitivity were found for both clinical and community samples. Birchwood et al. (1990) documented the reliability as 0.80 for the full scale and 0.82 for the social activity subscale. The

Chinese version was translated using the same method as in Chapter 4 (section 4.2.6). The Cronbach's alpha for the current sample of depressed women is 0.83, indicating a good internal consistency of this subscale on the pregnant sample in this study. In section 6.5.2, factor analysis of the SFS was presented. Factor scores were entered into subsequent regression analysis to investigate the association between depressive symptoms and various domains of social activities.

6.3.9 The Significant Others Scale Short Version (SOS)

The SOS was developed by Power, Champion, and Aris (1988) to measure the perceived quality of individuals' most important relationships. The scale assessed both the "structure" of support, and the "functions" of support. The "structure" of support involved the assessment of perceived support from 12 potentially important individuals (spouse or partner, mother, father, closest child, best friend, an important relative, best neighbour, boss, work colleague, important professional, and closest brother or sister, and other important person in respondents' lives). The "functions" of support included 10 items and assess either emotional support or practical support. For each item respondents are asked to rate the level of support they perceive and the 'ideal' level of support they would like to receive. A 4-item short form was later developed and used in this study to facilitate pregnant participants who might have difficulties in concentration. Participants were required to name up to 6 most intimate people, and rate the level of perceived support from each of the 6 people on a 7-point scale (1= never to 7 = always). Items on emotional support included: 1) trust, talk with frankly and share feelings with; 2) lean on and turn to in times of difficulty. Items assessing practical support included: 1) get practical help and 2) spend time with socially.

The original scale was reported to have a good six-month test-retest reliability (0.73-0.83) (Power et al., 1988). Concurrent validity was examined using the General Health Questionnaire (GHQ-28). Significant differences were found in discriminating between depressed and non-depressed groups. A factor analysis extracted three factors,

including emotional support, practical support and social fun. In the 2-item simplified and translated version by Tsang, Lam, and Ip (2000), good reliability was shown in that the Cronbach's alpha ranged from 0.59 to 0.97 on the emotional support item and 0.64 to 0.93 on the practical support item. The 4-item SOS used in this study was found to have a Cronbach's alpha of 0.82 for emotional support and 0.72 for practical support. In the current study, the 4-item SOS was scored in terms of total emotional support and physical support perceived by the participants from summing up the difference of ideal rating and actual rating indicating the level of support.

6.4 Statistical Analysis

The SPSS 20.0 software package was used for statistical analysis. Before going into details of answering each research question, section 6.5.1 presents descriptive statistics regarding mean, standard deviation, and normality test on SES, WSS, WFC, FWC, and the SFS (subscale).

Each research question was addressed as follows. Due to most variables being non-normal (see 6.5.1), non-parametric tests were deemed more appropriate.

1) Research question 1 examined the relationship between demographic factors and depressive symptoms. A cut-off value of 9/10 for the EPDS was used to categorize pregnant women into depressed versus non-depressed pregnant groups. Therefore, the dependent variable was a binary variable describing the presence or absence of depression. Continuous variables (maternal age, gestation week, and hours of work per week) were compared with a more robust Mann-Whitney U test for non-normal distribution of the data, while categorical variables (first pregnancy, level of education, employment status, and occupation) were compared using the Pearson's Chi-square test at a significance level of 0.05.

2) Research question 2 investigated the bivariate relationship between pregnant Inner Mongolia women and depressive symptoms for psychosocial predictors including self-esteem, social support, social activity, work-and-family conflict, and work stress. Spearman correlations between SES, WSS, WFS, FWS, SOC and SOC with MDAS (whole scale and each subscales), BDS, and EPDS were carried out. The purpose of this step was to examine the relationship of depression severity and predictor variables.

3) Research question 3 investigated the relationship between psychosocial risk factors mentioned in section 6.1 and the severity of antenatal depression, controlling for demographic variables (section 6.1). Hierarchical multiple linear regression using SPSS version 20.0 was used for this research question. The regression model determines the amount of variance in depressive severity accounted for by the psychosocial risk factors, while the demographic variables were controlled for. There were five regression models, facilitating the dependent variables of MDAS total score for overall depression severity, score of emotional, cognitive, somatic and interpersonal subscales on the MDAS. For each regression model, same set of independent variables were included: the total scores of SES, WSS, WFS, FWS, subscale scale of SFS and the emotional and physical subscales of SOS. In addition, the components of social activity (SFS) and work stress (WSS) were factor-analysed by EFA with the procedure introduced in chapter 4. The result of the factor analysis will be presented in section 6.5.2 (SFS) and 6.5.3 (WSS). Factor scores of each extracted factor from SFS and WSS were also included in the regression models as predictor variables. Before the variables were entered into regression, a few steps were carried out to prepare the variables for the regression. First, categorical variables (qualification, employment, and occupation), including dichotomous variables (first pregnancy, abortion history, history of depression) were recoded into dummy variables of 0 and 1. For variables with more than one categories (qualification, employment, and occupation), a

reference category was selected for the remaining categories to compare them with. There are two steps conducted in the regression model: Demographic variables were entered into the first block of predictors so their effects could be controlled for. The psychosocial variables were entered into the second block to determine if they account for additional variance after sociodemographic variables were put in the model. For each block the forward entry method was adopted. A few criteria were checked to see if the variables fulfil the assumptions for viable multiple linear regression. Firstly, Cook's distances (>1.0) was calculated and checked to locate influential cases and outliers (Field, 2009). Secondly, the presence of multicolinearity was detected by looking into the tolerance (<0.10) or the variance inflation factor (VIF >10) of each independent variable (Field, 2009). Thirdly, Spearman's correlation was examined to detect any high corrections (>0.7) between the independent variables (section 6.5.5). The Durbin–Watson statistic was computed to test for independence of error terms and sequential correlation of adjacent errors. The acceptable range of this statistic values from 1.50 to 2.50, with a value of 2 refers to uncorrelated residuals. Finally, normal distribution of standardized residuals was investigated through histogram and p-p plot. Transformation was applied to predictor and/or independent variables when assumptions were violated. In the preparation phase of the regression model, abortion history was dropped due to a large number of missing values (34.2%) that resulted in a substantial decrease of statistical power of the model after deletion of missing cases.

After the assumptions for multiple linear regression were checked, the model fit of each of the five models was examined by investigating several criteria: the overall model fit was indicated by the value of R^2 and the value of F ratio and its associated p value. The R^2 indicted the amount of variance explained by the predictors against the amount of variance not explained by the model. As a result, larger values of R^2 indicated a high proportion of variance of the dependent variable explained in the model. High F-ratio values and a

significant *p* value suggested a good model fit. All statistical tests were two-sided and at a significance level of 0.05.

Upon the establishment of the initial model with all demographic and psychosocial variables entered into the model, the least significant variables were removed from the model one at a time. A new model was then fitted without the least significant variable. The step was repeated until a resulting model was obtained containing only significant predictors. For each subsequent model fitted, ANOVA was checked for its significance.

6.5 Results

6.5.1 Item distribution and normality

The description of demographic characteristics, age, level of education, employment, occupation, hours of week per week, gestation week, first pregnancy, and abortion history, were reported in section 5.1. Table 6.1 presents the descriptive statistics on the scales used for the current study to assess the independent variables. The Shapiro-Wilk Test of Normality showed that except for the Social Functioning scale, a non-normal distribution was found for all the scales. Similarly, a skewed distribution was found for the total scores of all scales, except for the Social Functioning subscale and Rosenberg Self-esteem scale, which had an non-significant result on the Shapiro-Wilk Test of normality, suggesting a normal distribution of total item scores for these two scales. All factors showed a significant result, indicating their skewness in distribution. As a result, non-parametric analyses were used in the subsequent sections due to the violation of normality assumption for parametric analyses. For regression models, transformed outcome variables was used.

Table 6.1 psychosocial variables during pregnancy

Measures	N	Mean	S.D	Min	Max	W
Rosenberg Self-Esteem Scale	231	19.99	3.82	8	29	0.99**
Work Stress Survey	225	65.80	16.77	1	98	0.96**
Work-Family Conflict Scale	230	10.38	3.75	5	25	0.93**
Family-Work Conflict Scale	230	9.76	3.72	2	23	0.90**
Social Functioning Scale	233	47	8.39	23	68	0.99

W= Shapiro-Wilk Test of Normality **p<.01

6.5.2 Factor analysis of the Social Functioning Scale (subscale)

The parallel analysis (with Promin rotation) in the exploratory factor analysis (N = 234) yielded a two-factor solution, which accounted for 55.4% of the total variance in items (factor 1 eigenvalue = 10.29; factor 2 eigenvalue = 1.89). The Kaiser-Meyer-Olkin (KMO) test showed a good sample adequacy (0.92). All items demonstrated high inter-correlations with items within the same factor using polychoric correlation. Table 6.2 shows the rotated component matrix for all items. Items with cross-loadings were dropped from the analysis. Factor 1 (Interpersonal-orientated activities) accounted for 46.79% of variance. Factor 2 (Individual-orientated activities) accounted for 8.61% of variance. The first factor contained 8 items. Among these, 5 items carried the meaning of interaction with other individuals, whereas in Factor 2, items did not explicitly point to interaction with other people. In addition, items directly refer to interactions with other people (e.g. meeting, visiting relatives, being visited by relatives, visiting friends, and being visited by friends) had higher loadings on Factor 1 than the rest of items.

Table 6.2 Rotated Component Matrix of the Social Functioning Scale (subscale)

SFS Items	Factors	
	Interpersonal-orientated activities	Individual-orientated activities
6 Visiting places of interest	0.55	
7 Meeting, talk etc.	0.68	
9 Visiting relatives	0.70	
10 Being visited by relatives	0.67	
11 Visiting friends	0.76	
12 Being visited by friends	0.79	
13 Parties	0.50	
21 Eating out	0.41	
1 Cinema		0.58
2 Theatre/concert etc.		0.85
3 Watching indoor sport		0.76
4 Art gallery/museum		0.64
5 Exhibition		0.64
8 Evening class		0.95
14 Formal occasions		0.53
15 Disco etc.		0.88
16 Nightclub/ social club		0.93
17 Playing an indoor sport		0.51
19 Club/society		0.76
20 Pub		0.84
22 Church activity		0.99

6.5.3 Factor structure of WSS

Principle Axis Factoring (PAF) with an Oblimin (oblique) rotation of the 10 Likert scale items gave rise to a three-factor model. It accounted for 41.35% of the total variance in items. The Kaiser-Meyer-Olkin (KMO) test showed a moderately good sample adequacy (0.77). All items demonstrated high intercorrelations with items within the same factor using polychoric correlation. Table 6.3 shows the rotated component matrix for all items. Item 7 was dropped as it cross-loaded onto two factors. Factor 1 (Interpersonal-related pressure) accounted for 28.17% of total variance. Factor 2 (Personal responsibilities) accounted for 8.6% of variance, whereas the last factor (Working environment) accounted for 4.58% of the total variance. The first factor contained items on work and family conflict and interpersonal conflict. Factor

2 included items on responsibility. Factor 3 had factor loadings negatively loaded onto the factor. It is named working environment as it contains situations that people find hostile and aversive. Factor 2 and Factor 3 related more to personal feelings whereas Factor 1 involved other people in their working environment.

Table 6.3 Rotated Component Matrix of the Work Stress Survey

WSS Item Description	**Factors**		
	Interpersonal	Personal	work
8 My job often interferes with my family and social obligations or personal needs	.68		
9 I tend to have frequent arguments with superiors, co-workers or customers	.71		
10 Most of the time I feel that I have very little control over my life at work	.71		
2 My job has a lot of responsibility, but I don't have very much authority.		.58	
3 I could usually do a much better job if I were given more time.		.36	
1 I can't honestly say what I really think or get things off my chest at work			-.42
4 I seldom receive adequate acknowledgment or appreciation when my work is really good			-.59
5 In general, I am not particularly proud of or satisfied with my job			-.39
6 I have the impression that I am repeatedly picked on or discriminated against at work			-.78

6.5.4 Research question 1: Difference in demographic and psychosocial risk factors between depressed and non-depressed groups

The sample of pregnant women was categorized into two groups based on an EPDS cut-off value of 10. The two groups of participants were depressed (n=85) and non-depressed (n=149) and were compared in terms of demographic variables. As listed in Table 6.4 below, the Mann-Whitney U test for age, week of gestation, and hours of work showed no significant differences between the two groups; the Pearson's Chi Square Test was applied for categorical variables including first pregnancy, qualification, employment, and occupation. None of the demographic variables showed significant differences ($p<0.01$) between depressed and non-depressed women.

Table 6.4 Demographic factors by Depression Status

Demographic Measures	Depression Status		P
	Non-depressed (N = 149)	Depressed (N = 85)	
Continuous factors	Mean (S.D).	Mean (S.D)	
Age	29.4 ± 3.1	28.60 ± 3.4	0.90
Pregnant week	35.3 ± 5.9	36.0 ± 5.8	0.46
Hours of work per week	35.31±5.9	38.9 ± 10.4	0.59
Categorical factors	**N (%)**	**N (%)**	
First pregnancy			0.46
Yes	158 (67.5)	26 (11.1)	
No	40 (17.1)	9 (3.85)	
Abortion History (N=154)			0.22
Yes	50 (21.37)	13 (5.56)	
No	79 (33.76)	12 (5.13)	
Qualification			0.054
Middle School	5 (3.4)	8 (9.4)	
High School	13 (8.7)	14 (16.5)	
Undergraduate	119 (79.9)	57 (67.1)	
Postgraduate	12 (8.1)	6 (7.1)	
Employment			0.16
Full-time employment	127 (85.2)	66 (77.6)	
Full-time student	3 (2.0)	0 (0)	
Unemployed	8 (5.4)	8 (9.4)	
Others (maternity leave)	11 (7.4)	11 (12.9)	
Occupation			0.47
Professional	73 (49.7)	48 (57.8)	
Administrative	35 (23.8)	11 (13.3)	
Service	27 (18.4)	18 (21.7)	
Craftsmanship	1 (0.7)	0 (0)	
Laborious	3 (2.0)	2 (2.4)	
Others	8 (5.4)	4 (4.8)	

6.5.4.1. Difference in Psychosocial risk factors between depressed and non-depressed groups

The Mann-Whitney U test showed a significant difference ($p<0.01$) in total scores of several psychosocial scales (SES, WSS, SFS) between depressed and non-depressed women. Depressed pregnant women showed a lower score on the Rosenberg Self-esteem scale ($U=3203.00$, $p=.00$) and Social Functioning Scale (subscale) ($U= 5043.50$, $p=.012$), as well as a higher score on the Work stress survey ($U=3454.00$, $p=.00$). Non-significant differences were found between depressed and non-depressed pregnant women on the Work-Family conflict scale ($U= 5853.50$, $p =.56$) and Family-

Work conflict scale (U =5246.50, p =.062). As for emotional support and physical support, non-significant difference in total scores was found between depressed and non-depressed groups.

6.5.5 Research Question 2: Bivariate relationship between psychosocial variables and depression

The results of Spearman correlation between scores of the EPDS, BDI, MDAS and subscales with SES, WSS, SFS, WFS, FWS, and the two subscales of the SOS (Physical and Emotional) are shown in Table 6.3.3. A significant correlation was found for between total score of MDAS and all psychosocial scales (see Table 6.5). The subscales of MDAS significantly correlated with most psychosocial scales. However, there were less significant correlations between psychosocial scales with EPDS and BDI. For example, WFS correlated significantly with MDAS rather than EPDS and BDI. SFS and SOS did not correlate significantly with EPDS and FWS did not correlate significantly with BDI. All these correlated significantly with MDAS instead. These results pointed to a possibility of MDAS being more sensitive in capturing various components in depressive symptoms and could be used to investigate the relationship between depression and psychosocial risk factors.

Table 6.5 Spearman correlation of psychosocial factors with depression scales and subscales

Psychosocial factors	**EPDS, BDI, MDAS and subscales**						
	EPDS	BDI	MDAS	MDAS Emotional subscale	MDAS Cognitive subscale	MDAS Somatic subscale	MDAS Interpersonal subscale
SES	-.45***	-.33***	-.35***	-.25***	-.40***	-.26***	-.30***
WSS	-.38***	-.27***	-.22***	-.17*	-.23***	-.10	-.22***
WFS	.08	.05	.16*	.07	.17*	.13*	.17**
FWS	.16*	.12	.18**	.15*	.21***	.11	.16*
SFS	-.13	-.24***	-.14*	-.07	-.08	-.13*	-.21***
SOS Emotional subscale	.11	.15*	.21**	.21**	.19**	.17*	.15*
SOS Physical subscale	.11	.16*	.23***	.25***	.21**	.19**	.13

*p<.05, **p<0.01, ***p<.001

6.5.6 Research Question 3 Hierarchical Multiple Linear Regression

Hierarchical multiple linear regression was conducted to determine the variables significantly contributing to the overall depressive severity and severity of depressive symptoms in four dimensions. The final hierarchical multiple linear regression models are presented in tables 6.6-6.10 with five dependent variables: total score of MDAS, scores of the emotional subscale, cognitive subscale, somatic subscale and the interpersonal subscale.

Model one Hierarchical Multiple Regression of MDAS total score and demographic and psychosocial variables

The first model investigated the relationship between the MDAS total score and the demographic and psychosocial variables described in section 6.1.2. As introduced in section 6.4, demographic variables were entered into the first block whereas psychosocial variables were entered into the second block. Subsequent steps involved removing the least significant variables one by one and refitting the model with remaining predictor variables. The step was repeated multiple times until all the independent variables left were significant and the final model is presented in table 6.6. The predictor variable is natural log-transformed MDAS total score. The tables also present the unstandardized β coefficients, standard errors of the β coefficients, and standardized coefficients and the p-values of all variables.

After removing the least significant variables, the remaining demographic variables (dummy coded categories postgraduate education and full-time employment) were added to the first block and constituted a significant increase in shared variance in total MDAS ($\Delta R^2 = 0.059$) above and beyond the null model, $F(2, 218) = 6.847$, $p<0.001$. The addition of the SES score, WFS and SOS emotional subscale led to a significant increase ($\Delta R^2 = 0.190$) of shared variance in total MDAS, $F(3, 215) = 18.122$, $p< 0.001$.

Interpreting the β coefficients within the context of logarithmic transformation of the dependent variable, participants with postgraduate education are expected to have 15.3% increase in the total score of MDAS compared to those with middle school qualification. Full-time employment is expected to have 9.8% decreased in total score of MDAS than other occupation categories (mostly self-employed and housewives). While the demographic variables were controlled for, higher score of SES had 2.2% decrease of total score of MDAS, whereas higher score of total WFS increased 0.8%

of total score of MDAS. Discrepancy in emotional support between ideal and actual emotional support increased 5.9% of total score of MDAS.

Table 6.6 Final Hierarchical Multiple Regression of MDAS Total Scale

Variables	**β**	**S.E.β**	**Standardized coefficients**	**t**	***P***
Step 1 Demographic variables					
Qualification					
Postgraduate	.143	.054	.160	2.645	.009
Employment					
Full-time employment	-.094	.038	-.150	-2.445	.015
Step 2 Psychosocial factors					
SES	-.022	.004	-.349	-5.693	.000
WFS	.008	.004	.133	2.221	.027
SOS emotional subscale	.057	.018	.190	3.097	.002

Model fit: ($F (5, 215) = 14.257$, $p< 0.001$); $R^2 = .249$

Model two Hierarchical Multiple Regression of the MDAS emotional subscale and demographic and psychosocial variables

The second model examined the association between natural-log transformed total score of the emotional subscale and the independent variables as in first model. Using the same method to remove all least significant variables in the initial model, the first block contained dummy coded laborious job. However, it constituted a marginally non-significant increase in shared variance in the emotional subscale of MDAS ($\Delta R^2 = 0.017$) above and beyond the null model, $F (1, 219) = 3.794$, $p=0.053$. However,

adding in SES score and SOS physical subscale led to a significant increase (ΔR^2 = 0.157) of shared variance in total MDAS, F (2, 217) = 20.656, p< 0.001.

Examining the β coefficients within the context of logarithmic transformation of the dependent variable, participants with a laborious job increase 33.6% of total score on emotional subscale of MDAS than those working in unspecified field. While the demographic variable was controlled for, higher scores for the SES decreased 2% of total score on emotional subscale of MDAS, whereas higher scores for total WFS increased 0.8% of total score on emotional subscale of MDAS. Discrepancy in physical support between ideal and actual physical support increased 10% of total score on emotional subscale of MDAS.

Table 6.7 Final Hierarchical Multiple Regression of MDAS Emotional Subscale

Variables	**β**	**S.E.β**	**Standardized coefficients**	**t**	***P***
Step 1 Demographic variables					
Occupation Laborious	.290	.124	.144	2.327	.021
Step 2 Psychosocial factors					
SES	-.020	.005	-.254	-4.065	.000
SOS Physical subscale	.096	.022	.268	4.284	.000

Model fit: (F (3, 217) = 15.262, p< 0.001); R^2 =.174

Model three Hierarchical Multiple Regression of MDAS cognitive subscale and demographic and psychosocial variables

The third model examined the association between natural-log transformed total score of the cognitive subscale and the independent variables as in the first model. Using the

same method to remove all least significant variables in the initial model, the first block contained dummy coded postgraduate qualification. However, it constituted a marginally non-signification-significant increase in shared variance in the cognitive subscale of MDAS ($\Delta R^2 = 0.006$) above and beyond the null model, $F(1, 219) = 1.215$, $p=0.272$. Adding in SES score, total WFS and SOS emotional subscale led to a significant increase ($\Delta R^2 = 0.23$) of shared variance in the MDAS cognitive subscale, $F(3, 216) = 21.692$, $p< 0.001$.

In terms of the β coefficients within the context of logarithmic transformation of the dependent variable, participants with postgraduate qualification increased 15.6% of total score on cognitive subscale of MDAS compared to those with a middle-school qualification. While the demographic variables were controlled for, higher score of SES decreased 2.7% of total score on cognitive subscale of MDAS, whereas higher score of total WFS increased 0.9% of total score on cognitive subscale of MDAS. Discrepancy in physical support between ideal and actual physical support increased 6.7% of total score on cognitive subscale of MDAS.

Table 6.8 Final Hierarchical Multiple Regression model of MDAS Cognitive Subscale

Variables	B	S.E.β	Standardized coefficients	t	P
Step 1 Demographic variables					
Qualification					
Postgraduate	.145	.060	.146	2.418	.016
Step 2 Psychosocial factors					
SES	-.027	.004	-.391	-6.360	.000
WFS	.009	.004	.126	2.103	.037
SOS emotional subscale	.065	.020	.193	3.183	.002

Model fit: ($F(4, 216) = 16.659$, $p < 0.001$); $R^2 = .236$.

Model four Hierarchical Multiple Regression of MDAS somatic subscale and demographic and psychosocial variables

The fourth model examined the association between natural-log transformed total score of the somatic subscale and the independent variables as in the first model. The first block contained dummy coded full-time employment. It constituted a significant increase in shared variance in the somatic subscale of the MDAS ($\Delta R^2 = 0.036$) above and beyond the null model, $F(1, 221) = 8.359$, $p<0.01$. In the second block when adding in SES score and the SOS physical subscale led to a significant increase ($\Delta R^2 = 0.093$) of shared variance in the somatic subscale of MDAS, $F(2, 219) = 11.687$, $p < 0.001$.

Examining the β coefficients within the context of logarithmic transformation of the dependent variable, participants with full-time employment decreased 10.6% of total score on somatic subscale of MDAS compared to those in other unspecified job categories. While the demographic variables were controlled for, higher score of SES decreased 1.8% of total score on somatic subscale of MDAS, whereas discrepancy in

physical support between ideal and actual physical support increased 5.3% of total score on somatic subscale of MDAS.

Table 6.9 Final Hierarchical Multiple Regression model of MDAS Somatic Subscale

Variables	B	S.E.β	Standardized coefficients	t	P
Step 1 Demographic variables					
Employment					
Full time employment	-.101	.046	-.139	-2.174	.031
Step 2 Psychosocial factors					
SES	-.018	.005	-.245	-3.813	.000
SOS physical subscale	.052	.022	.154	2.403	.017

Model fit: $(F (3, 219) = 10.847, p< 0.001)$; $R^2 = .129$

Model five Hierarchical Multiple Regression of MDAS interpersonal subscale and demographic and psychosocial variables

The final model examined the association between natural-log transformed total score of the interpersonal subscale and the independent variables as in the first model. After removing all least significant variables in the initial model, the first block contained dummy coded postgraduate qualification and full-time employment. It constituted a significant increase in shared variance in the interpersonal subscale of the MDAS ($\Delta R^2 = 0.044$) above and beyond the null model, $F (2, 228) = 5.286$, $p<0.01$. Adding in SES score in second block led to a significant increase ($\Delta R^2 = 0.100$) of shared variance in total MDAS, $F (1, 227) = 26.509$, $p< 0.001$.

Examining the β coefficients within the context of logarithmic transformation of the dependent variable, participants with postgraduate qualification increase 16.9% of total score on interpersonal subscale of MDAS compared to those working in an unspecified field. Participants with full-time employment decreased 12.6% of total score on interpersonal subscale of MDAS compared to those in other unspecified job categories. While the demographic variables were controlled for, higher score of SES decreased 2.3% of total score on interpersonal subscale of MDAS.

Table 6.10 Final Hierarchical Multiple Regression model of MDAS Interpersonal Subscale

Variables	**B**	**S.E.β**	**Standardized coefficients**	**t**	***P***
Step 1 Demographic variables					
Qualification (middle-school as reference)					
Postgraduate	.156	.065	.151	2.403	.017
Employment (others as reference)					
Full-time employment	-.119	.045	-.163	-2.614	.010
Step 2 Psychosocial factors					
SES	-.023	.005	-.323	-5.149	.000

Model fit: ($F(3, 227) = 12.755$, $p < 0.001$); R^2 of .144

6.6 Discussion

This study investigated the relationship between demographic and psychosocial variables (maternal age, gestation week, first pregnancy, level of education, employment status, occupation, hours of work per week, self-esteem, social support, social activity, work-and-family conflict, and work stress) and depressive symptoms.

6.6.1 Research Question 1: The relationship between demographic variables and antenatal depression

The results from the Chi square tests showed that none of the demographic variables showed significant differences across depressed and non-depressed groups categorized by EPDS >10. This finding is in contrast with the findings of Lau et al. (2011) which reported that young age is a risk factor of depressive symptoms. Similarly, young age (<25) is also found in other studies to predict antenatal depression (Pottinger, Trotman-Edwards, & Younger, 2009), whereas Zhao, Kane, Mao et al. (2016) reported a significant positive association between higher risk of depression and higher age on pregnant women with obstetrical complications. One possible explanation is that the majority of participants were skewed towards older age range with only 3.4% of participants aged below 25. This could explain the non-significant association between age and depressive symptoms. As pregnant women in this study is a community sample with no assumption of health issues, it is likely that higher age was a co-occurring factor with obstetric complications for antenatal depression (Zhao et al., 2016). In addition, a non-significant association was found between depressive symptoms and gestation week, history of abortion, and first pregnancy. This result is inconsistent with previous findings (Koleva et al., 2011; Marcus et al., 2003; Rubertsson et al., 2005; Zeng et al., 2015). For example, Koleva et al. (2011) discovered that earlier stage of pregnancy, and fewer previous pregnancies were significantly associated with depression. Individuals with lower socio-economic positions have also been found to be more vulnerable to developing mental distress (e.g. Mackenbach et al., 2008). There are two possible reasons for this result. First, the sample was skewed in that a high percentage of participants were in their third trimester of pregnancy (mean gestation age = 35.56). Second, the sample was also skewed towards higher socio-economic status and higher educational attainment in that the majority of the participants (82.9%) had a bachelor's degree or above and over half of them worked in a professional setting (52.6%). The differences in sample characteristics between this study and previous studies may have explained the discrepancy in findings.

However, findings in this study on education attainment and employment have enriched the picture that has emerged from previous literature by reflecting the situation pregnant women in China face that could vary from other countries. Although the demographic variables showed non-significant differences between groups of depressed and non-depressed pregnant women, in the regression models women with higher education attainment are more likely to have increased depressive symptoms than those with middle school education. This finding is inconsistent with a recent study by Bavle et al. (2016), which reported significant association between lower education and depression severity on Indian pregnant women. It contradicts previous findings that a lower level of education is a risk factor for depression (Zhao et al., 2016). In particular, work-family conflict associated positively and significantly with higher total score of MDAS and cognitive subscale. This could reflect that women with higher education attainment are possibly more prone to depressive symptoms during pregnancy in balancing their work and families, possibly due to a higher ranking they could hold in work places and the possibility of unfulfilling career and family aspirations (Bavle et al., 2016).

Nevertheless, in line with previous studies (Andajani-Sutjahjo, Manderson, & Astbury, 2007) that unemployment is a risk factor for antenatal depression, full time employment is reported in this study to negatively associate with overall depressive severity, somatic and interpersonal aspects of depression than others reported not having a secure job. This may imply that they had greater job security and less financial strain, both of which have been demonstrated to negatively relate to depressive symptoms (Yoon & Kim, 2013). This finding could also suggest its protective function against antenatal depression in keeping women occupied and boosting their self-esteem. Hoven, Wahrendorf, and Siegrist (2015) also reported the mediating effect of work stress (effort-report imbalance and low control) on occupational class and status and depressive symptoms. In particular, all occupational categories did not contribute significantly in associating with antenatal depression except for laborious job, which is significantly related to depressive severity on the emotional subscale.

6.6.2 Research Questions 2 and 3 - The association between psychosocial risk factors and antenatal depression

From sections 6.5.2.1 to 6.6.2.4, each psychosocial risk factor will be discussed in individual sections about its contribution to depressive symptoms in China and its predicting role in the hierarchical multiple linear regression models with demographic variables controlled for. The reason to discuss research question 2 and 3 together is because it helps to draw a unified picture on risk factors in pregnant Chinese women.

6.6.2.1 Self-esteem and antenatal depression

This study showed a significant relationship between low self-esteem and antenatal depression. Self-esteem also emerged as a significant predictor of depressive symptoms in Chinese pregnant women in all five regression models. A total score from the Rosenberg Self-esteem Scale was found to show a significant difference between the pregnant and non-pregnant groups. It is also significantly associated with the EPDS, BDI, MDAS and all its subscales. When the demographic variables were controlled for in the multiple regression model, a significant effect was also found between self-esteem and depression. This finding is in line with previous findings that low self-esteem was found to be a risk factor for prenatal depression (Leigh & Milgrom, 2008; Ritter, Hobfoll, Lavin, Cameron, & Hulsizer, 2000). Similarly, in the study by Karacam and Ancel (2009), a negative self-perception was found to be a significant factor in depression in multiple linear regression. In studies such as Jesse, Kim, and Herndon (2014), self-esteem is found to mediate the relationship between stress and depressive symptoms. The finding added to the current finding that negative self-esteem as a significant contributor to overall depression and depressive symptoms in various domains.

6.6.2.2 Social support and antenatal depression

Social Support was significantly correlated with depression scores and was found to be a significant predictor in the various regression models except for interpersonal subscale of MDAS. In this study, two components of social support, emotional support and physical support were found to be significant predictors of MDAS scales and subscales. Greater discrepancy between ideal and actual emotional support contributed to increase in overall depressive severity and cognitive symptoms. However, greater discrepancy between ideal and actual physical support contributed to increase in emotional and somatic symptoms of depression. Interpersonal symptoms were not associated with social support in this study. This finding is in line with that in previous literature that social support has been shown to have both direct and moderating effects on women's perceived stress and antenatal depressive symptoms (Lau, 2011; Lau et al., 2014). Its importance has been demonstrated in previous studies (Agostini et al., 2015) as a protective factor against depression in pregnant women. The result could also point to the kind of support pregnant Inner Mongolian women need from their family both emotionally and in a practical way. The findings also added to the current research that not only does overall perception of level of social support affects depressive severity (Biaggi, Conroy, Pawlby, & Pariante, 2016), but also the discrepancy of perception between expected and actual supported mattered to depression during pregnancy. As Lee et al. (2004) postulated, given how much Chinese culture values pregnancy as providing a continuation of the family lineage, women expected great attention and care given to them and can impact on their mental health during pregnancy. In addition, the traditional practice and belief of "foetal education" puts pregnant women in a situation of improved social support and status, including more care, support and affection. The situation also aims to eliminate unnecessary exertion, poor diet, and unhappy emotions. Under the one-child policy, the foetus is greatly cherished (Lee et al., 2004). This study pointed to the importance of emotional support for Inner Mongolian pregnant women during pregnancy for prenatal care. This is also an area under researched in Inner Mongolia.

6.6.2.3 Job Stress, work-life-balance and antenatal depression

To date, this study is the first to examine job stress and work-life balance among pregnant women in Mainland China. Although work stress and work-life balance have been shown to be associated with depression in the general population, less research has been conducted with pregnant Chinese women. Consistent with previous findings, overall level of work stress significantly distinguished depressed and non-depressed pregnant women in this study (Bavle et al., 2016). In the factor structure of WSS, the primary factor that explained the largest proportion of variance consists of work-and-family conflict items and items that involved interpersonal difficulties. The factor structure reflected the important role of interpersonal relationships in contributing to job-related stress in Chinese pregnant women. However, factors associated with work stress were not significant risk factors of antenatal depression. The finding did not repeat results from previous studies such as Sanguanklin et al. (2014), which demonstrated the association between job strain and psychological distress for employed pregnant women in Thailand. The factor (working environment) comprised job-related stress which included lack of rewards (inadequate appreciation; job dissatisfaction; being picked on and experiencing discrimination) and surface acting (I can't honestly say what I really think or get things off my chest at work) that have been shown to be associated with depression in other studies (Yoon & Kim, 2013). However, in line with previous studies (Wang et al., 2011) and the hypothesis, work-family conflict was found to be a significant risk factor for overall severity in depression during pregnancy as well as emotional and cognitive domains of depressive symptoms. This could suggest the difficulties to balance work and family could be a source of stress for Chinese women in their later stage of pregnancy. This result is consistent with previous proposals for financial and family struggle for Chinese women, who are still likely to remain in their jobs till the third trimester. This struggle thus is linked to antenatal depression in this empirical study. The finding shields light into the adverse situation that Chinese women could be facing in pregnancy and points to directions of future policymaking towards improved quality of life and mental health during pregnancy. As the majority of participants were in their third trimester (>90%), it is

also worth investigating these job-related factors such as work stress, work-life balance and depression on participants in early pregnancy.

6.6.2.4 Social activity and antenatal depression

This is the first study to explore whether interpersonal activities contribute to mental health among Chinese pregnant women. Previous studies often looked at social functioning in a sum score (e.g. Liu, 2013). Numerous studies have been conducted on the benefits of physical activity on psychological health during pregnancy (Tendais, Figueiredo, Mota, & Conde, 2011). Consistent with the study by Bavle et al. (2016), overall level of social activity in this study significantly differed between depressed and non-depressed pregnant women by EPDS cut-off. To investigate the aspect of social life associated with depressive symptoms in various dimensions, the factor analysis of social activity gave rise to two factors. Factor 1 (Interpersonal-orientated activities) emerged as the stronger factor, consisting of events that explicitly involved interactions with other people in the women's social network. Factor 2 (Individual-oriented activities) is a weaker factor that did not utilize respondents' social networks. The factor analysis revealed the importance of interpersonal involvement in Chinese pregnant women's daily lives. This result is consistent with the theoretical hypothesis of the important role that interpersonal relationships play in Chinese culture. A significant and positive correlation between SFS with MDAS, somatic and interpersonal subscales pointed to a possibility of association between depressive symptoms and social activities. However, a non-significant association was found between the factor and depression severity. It is likely that participants in their third trimesters could be highly restrained to home activities, contributing to a less obvious social effect. Future studies on pregnant women in their earlier stages of pregnancy could be conducted to examine a more apparent effect of social activities on antenatal depression.

The design of study 3 is subjected to several limitations. First, it contains a limited number of risk factors. More factors tied to social cultural context in China could be brought in to future studies to study the interaction effects between factors. Second, the demographic variables were collected based on recollection of the participants which could subject to bias. Third, a greater sample size are also advised.

6.7 Chapter summary

This chapter investigated the demographic and psychosocial risk factors that may be associated with antenatal depression in Inner Mongolian pregnant women. Insignificant association was found for demographic and psychosocial risk factors between depressed and non-depressed pregnant women based on EPDS cut-off value. However, the result of the 5 regression model revealed similar pattern that a combination of employment and qualification, low self-esteem, work-family conflict and social support were found to be associated with the total score and various subscales of the MDAS. When controlling for demographic variables, low self-esteem, work-family conflict and social support were significantly associated with depressive symptoms in general and in different domains. In particular, low self-esteem is the most salient risk factor that significantly associated with overall depression severity and severity of symptoms in each domain of depression. Discrepancy in expectation of actual and ideal social support significantly associated with total MDAS score and the scores of all subscales except interpersonal subscale. Work-family conflict significantly associated with the scores of total MDAS and cognitive subscale. The results in this chapter showed that this study illustrated a cultural characteristics in risk factors for antenatal depression.

CHAPTER 7

GENERAL DISCUSSION

7.1 Introduction

The purpose of this thesis was to provide further insights into the psychometric properties and factor structure of the MDAS in Inner Mongolian depressed people, with a specific focus on pregnant women. It also explored the risk factors associated with antenatal depression in pregnant Inner Mongolia women. The three empirical chapters expanded our understanding of assessing depressive symptoms for pregnant women living in a more collectivist culture than in other parts of China and the rest of the world, as well as the risk factors that are associated with depression severity. It adds to the limited research on depression in China. It also elucidates factors that are linked to antenatal depression in Inner Mongolian women in its specific context of the current social and occupational environment. These factors will be discussed in detail in section 7.4.

Study 1 provided a validation of the Chinese-MDAS with a Chinese clinically depressed population. Study 2 sheds light on depression among pregnant women in Inner Mongolia, who have been understudied in the Chinese research literature. Finally, study 3 considered factors within the Chinese cultural context that may form risk factors for depression among pregnant women during pregnancy.

This final chapter aims to synthesise the main findings across the previous empirical chapters covering three main areas: depression in China, depression in pregnant women, and risk factors for antenatal depression in China. It addresses their implications for research and practice regarding depression among depressed patients and pregnant women in Inner Mongolia. This chapter ends with reflecting on research

limitations and future directions for research.

7.1.1 Summary of key findings

Chapter 4 validated the 52-item Chinese-Multidimensional Depression Scale (Chinese-MDAS) and investigated the symptom profile of clinically depressed individuals from Inner Mongolia using Exploratory Factor Analysis (EFA). The results reported good psychometric characteristics of the Chinese-MDAS for clinically depressed Chinese patients in Inner Mongolia, including a high Cronbach's alpha, significant and high correlations of the Chinese-MDAS total scale and each subscale with the BDI. Regarding the symptom profile of depressed patients, a three-factor model was generated. A strong factor emerged composed of prominently-loaded cognitive and emotional symptoms, one somatic and one interpersonal symptom. Following these were two weaker factors, the first of which was primarily interpersonal, whereas the third factor contains primarily somatic symptoms. Results pointed to the contribution of an interpersonal style of expression in the Chinese expression of depression and making use of it in assessment scales. As interpersonal harmony and role fulfilment are both important in Chinese culture, especially for women, interpersonal symptoms of depression could be particularly salient indicators for assessing depression severity in this population.

Chapter 5 validated the Chinese-MDAS on pregnant women in Inner Mongolia. A comparison was made using the CFA of three factor models on the CFA, including the originally proposed four-factor model, a three-factor model from study 1, and a single-factor model including all symptoms on the MDAS. It supported the best-fit model as the four-factor model corresponding to each of the subscales in the MDAS. The result supported using the originally developed MDAS and its subscales with Chinese pregnant women rather than the three-factor model suggested in study 1.

Chapter 6 examined a number of risk factors shown to be associated with depression in previous studies and which could possibly link to antenatal depression in China with demographic variables controlled for. Following the result of study 2 the best-fit 4-factor model of MDAS was used in examination of risk factors on severity of antenatal depression. Among the demographic factors, education attainment, employment and occupation correlated significantly with depressive symptoms in the regression models. In the hierarchical multiple linear regression models with significant demographic variables controlled for, self-esteem, work-family conflict, and social support were significant predictors for the model using predictors of MDAS total scale and four different subscales.

7.1.2 Strengths of the thesis

The series of studies has strengths in several aspects. First, they are the first to investigate the symptom pattern in an Inner Mongolian depressed population and in pregnant women from the perspective of individual symptoms rather than of sum scores on a symptomatic scale. The results fill the knowledge gap in the current body of research that uses factor analytical studies of the self-report instruments to identify symptom domains in adult psychiatric populations (Shafer, 2006) and in the paucity of antenatal research in China. Indeed, a few psychometrically-fit self-report measures for Chinese populations (Huang et al., 2006; Leong, Okazaki, & Tak, 2003; Yeung et al., 2008) have dominated depression research in China and have become one of the reasons for the diminishing cultural research on depression (Leong & Okazaki, 2003). The Western conception of depression is generally assumed to fit Chinese populations (Wong, 2009). Furthermore, cross-cultural studies of Chinese immigrants show that they constantly go through changes such as acculturation, social deprivation, uprootedness, adaptation, assimilation and Westernization (Abbott, Wong, Williams, Au, & Young, 1999; Leong et al., 2003; Takeuchi et al., 1998; Wang, Gorenstein, & Andrade, 2004) and that could give rise to a factor structure more closely resembling the Western one (Ying et al, 2000). The studies in the thesis expand the existing knowledge to a population from a more collectivistic background.

In addition, the studies add Inner Mongolia to the current mono-ethnic or mono-cultural concept of Chinese populations. Within the country, people in the north hold even stronger collectivistic values than people in the south (Vliert et al., 2012). Individuals living in a more collectivist part of China, such as Inner Mongolia, adhere more to traditional cultural values and behavioural norms of Confucianism. In addition, Chinese populations in different locations may experience different implementations of policy, especially birth-control policy, and a different extent of westernization. Each of these could impact on the expression of depression (Lai, 2009). Generalizing Chinese populations from one locality to all from other geographic regions could miss out important information for the depression concept. For example, Chinese from Hong Kong and Taiwan have not been through the same social and political changes in the past three decades, especially the one-child policy, which could influence the depressive symptom profile especially during pregnancy. The results thus add to the existing findings on Chinese populations from cities such as Shanghai, Beijing, Chengdu and more westernized Hong Kong.

A second strength is in the validation and potential clinical use of the Chinese-MDAS. When it was developed, the MDAS showed good psychometric properties for a community sample in the UK and Hong Kong (Cheung & Power, 2012) but has never been validated in a clinical sample. It is the first depression assessment scale to include comprehensive interpersonal symptoms, which could also fit a Chinese context. Its validation on a clinical sample and pregnant women is important for its future implementation for use in Chinese pregnant and clinical populations.

The studies are also the first to investigate how risk factors related to the Chinese context including job stress, social functioning, and work-life balance influence depressive symptoms during pregnancy. These factors have been studied in the general population but not in pregnant Chinese women. The results provide more insights into the possible effects of context-related risk factors for Inner Mongolian pregnant women.

7.1.3 Clinical applications

The Chinese-MDAS was validated with clinically depressed Chinese patients (Chapter 4) and pregnant women (Chapter 5) in Inner Mongolia. Both studies revealed psychometric properties in the two samples. These included a high reliability; a moderate to good correlation was found between the Chinese-MDAS and the BDI (studies 1 and 2) and the EPDS (study 2). Confirmatory factor analysis also supported the four-factor model of the Chinese-MDAS corresponding to the four sub-scales of the original English language MDAS as the best-fit model for pregnant women in Inner Mongolia. The studies reported in this thesis provide empirical evidence that the Chinese-MDAS is a useful tool for measuring depressive severity in Chinese clinically depressed and pregnant samples. In addition, each subscale would be potentially useful for future research to assess depressive symptoms in various domains and the risk factors associated with them. The using of a four-subscale MDAS showed that on top of emotional, cognitive, and somatic symptoms, how interpersonal symptoms contributed to the symptom profile in Chinese clinically depressed patients and are useful in assessing depression in pregnant Chinese women. Hence, inclusion of interpersonal dimensions is particularly useful in self-report questionnaires during screening in order to improve the chance of identifying possibly depressed pregnant women.

7.2 Depression in China

In this section, major findings across studies will be discussed as to how studying depression in clinical samples lays a foundation for subsequent studies.

7.2.1 Factor structure and cultural characteristics of Chinese depressed people

Study 1 validated the Chinese-MDAS on a clinical sample and provided evidence to support good psychometric characteristics of the Chinese-MDAS for use in a Chinese population. The findings also provide insight on the depressive symptom profile for depressed Chinese patients by generating a cultural specific factor structure of the MDAS with an Inner Mongolian clinical sample. Exploring the factor structure of a depression measure not only sheds light on the cultural manifestation of symptoms but also reflects the underlying psychological mechanisms that could be useful in therapy and research. Hence the result from EFA in study 1 adds to the body of research that applies factor analytic techniques to non-Western populations in order to study the relationships between depressive symptoms (e.g. Goldberg & Hiller, 1979; Goldberg et al., 1976; Downing & Heschbacher, 1976; Huppert et al., 1989; Ohta et al., 1995; Shek, 1993; Takeuchi & Kitamura, 1991, Stuart et al., 1993; Medina-Mora et al., 1983; Ohta et al., 1995). In particular, the results of study 1 shed light on the cultural characteristics of depressive symptoms through examining interpersonal symptoms. Indeed, Ho (1996) in his doctoral thesis also investigated the cultural effects, especially collectivism and individualism on depressive symptom expression across Beijing, Hong Kong, Taipei, and Chicago. However, the study was done on community samples of undergraduate students, and samples were compared on sum scores of affective, existential, somatic, cognitive and interpersonal subscales, which provided less information on the detailed picture of how individual symptoms were related to each other. The studies in the present thesis thus give a glimpse into how interpersonal symptoms relate to other symptoms in Chinese populations through examining factor loadings of each symptom. Adding the interpersonal dimension to factor analysis gives rise to a richer and potentially more informative picture of the depressive symptom profile in a Chinese sample.

There are two important implications from the findings of study 1. First, the study showed that the Chinese-MDAS is suitable for use in assessing depressive severity. In particular, the findings supported the proposal that the interpersonal dimension contributes to both depressive assessment and symptom pattern in Chinese depressed patients. Not only does the full scale show good psychometric properties, but also the

interpersonal subscale of the Chinese-MDAS is found to have the largest effect size among the four subscales (see chapter 4 section 4.4.2.2). This result lays a good foundation for study 2 to apply the Chinese-MDAS with pregnant women in Inner Mongolia.

A second important implication is for the factor structure of the Chinese-MDAS. The three-factor structure in study 1 replicates findings in previous studies. The dominating factor in Study 1 captured symptoms mostly found in DSM diagnostic criteria, such as: depressive mood, loss of interest, agitation, and social withdrawal followed by a second factor which contained mostly somatic symptoms. This finding is consistent with factor structures found in previous research. Inner Mongolian depressed patients are thus shown to demonstrate universal depressive symptoms according to the DSM-V (APA, 2013). This result replicates previous findings such as in Lee, Kleinman, and Kleinman (2007), which also reported that depressive symptoms generally reported by Euro-Americans were also recognized in Chinese populations. Indeed, the Chinese diagnostic system, CCMD and the DSM/ICD diagnostic systems share many similarities in symptom criteria (Parker et al., 2001). In other studies using various self-report depression instruments, affective and cognitive symptoms often remain in the first extracted factor, followed by somatic symptoms. Ying (1988, 2001) had already tried to investigate the cultural characteristics of depression in China through the factor structure of the CES-D. However, there were only two interpersonal symptoms in the CESD that provide limited information on symptom patterns. Zhang et al. (2012) reported a 3-factor structure of the CES-D (positive affect, interpersonal problems, depressive mood and somatic symptoms combined) in a rural Chinese sample. The results from these studies thus suggested that a Chinese population, despite the influence of a collectivistic culture, shares similar core symptoms of depression to the Western conceptualization of depression, with Western populations. This implies that the core symptoms are relatively universal across both individual and collectivist cultures.

In study 1, cognitive symptoms were broken down into two factors. Guilt/feeling worthless formed a factor with interpersonal symptoms. Loss of interest and pleasure emerged in the core symptom factor with emotional symptoms and social withdrawal. The breaking of cognitive symptoms into two factors replicated the study of Yang et al.'s (2015), which employed a highly representative sample of around 6000 clinically depressed participants from 45 cities and 23 provinces in China. Inner Mongolia did not feature in Yang et al's study but the current study in the thesis shows that depressed patients share similar patterns with other populations across China. Similarly, Wang, Andrade, and Gorenstein (2005) reported the cognitive-affective factors and somatic factors for the BDI in a Brazilian Chinese sample. The former factor also included items such as guilt feelings, sense of failure, self-dislike, suicidal thoughts, lack of satisfaction, sense of punishment, and pessimism. The latter factor included items such as fatigability, somatic preoccupation, distortion of body image, and work inhibition.

As reviewed in Chapter 1, cross-cultural investigations of depression symptoms in Chinese populations have been dominated by the concept of somatization (Wong, 2009). Fewer studies have examined the symptom profile of Chinese depressed people in terms of affective, cognitive and interpersonal distress (section 1.7.1). Existing studies have also been limited by the lack of items designed to capture aspects of the symptom profile that may vary across cultures. Cross-cultural research in symptom characteristics usually recruits Chinese immigrants living within Western contexts (Wong, 2009). Variation in the factor structure of standardized measures of depression compared to Western samples could reflect cultural differences in the expression of emotion and mood. In study 1, interpersonal symptoms add to the picture of symptom patterns. In factor 2 of study 1, they are grouped with negative self-concept and Beck's triad of worthlessness. The finding shows that depressed patients hold a negative view of the self, the future and also their social environment and surroundings. This suggested that social context, such as the feeling of being unwelcomed by others might influence Chinese people's negative self-concepts and negative cognition. These results are in line with the findings of Zheng et al. (1986) that 'guilt', 'failure' and 'hopelessness' were expressed by Chinese depressed people as 'wanting to apologize

to others', 'being judged in social context' and 'no one cares about me'. Emerging in the same factor in Study 1, item 6 (guilt), item 17 (feeling worthless), item 19 (self-blame), and item 20 (life feels meaningless) are coherent with the symptoms reported in Zheng et al. (1986) to be used by Chinese populations as an expression of depression. Cultural differences in experiencing and expressing of depressive symptoms is also demonstrated in the study by Zhang et al. (2011), which compared Chinese and Dutch individuals in factor structure. The study found that the Depressed Affect and Interpersonal Problems domain of the CES-D, especially depressed and fearful on the Depressed Affect factor and dislike in the Interpersonal Problems, are less invariant across Chinese and Dutch samples. However, the item content of the CES-D with few interpersonal symptoms limited discovery of cultural differences regarding other depressive symptoms. Further discussion of interpersonal dimensions will be found in section 7.3.2.

7.3 Depression during pregnancy in China

With a special focus on pregnant women, the thesis research highlights the best-fit factor structure of the Chinese-MDAS when used with pregnant women in Inner Mongolia. The results of study 1 bring into the picture interpersonal symptoms in Chinese. Indeed, the thesis research has a special focus on pregnant women, who were studied in studies 2 and 3. The factor structure found in study 1 pointed to the possibility of developing subscales that fit the cultural characteristics of depression in China, especially antenatal depression. The findings of study 2 provide additional information on the assessment of depressive symptoms in Chinese pregnant women. As reviewed in chapter 2, the influence of a collectivistic culture and the combination of pregnancy-related experiences (e.g. one-child policy) in China could contribute to cultural characteristics of the depressive symptom profile in Chinese pregnant women including a greater emphasis on interpersonal symptoms of depression. Interpersonal symptoms could play a greater role in the symptom profile in pregnant women. Studies 2 and 3 constructed a picture of depression during pregnancy in Inner Mongolia, one of the most collectivist locations in China in respect of the cultural, social, and political

environment in China's contemporary society. The series of studies presented in this thesis research is the first to examine factor structure and risk factors during pregnancy in Inner Mongolia.

7.3.1 Comparison of factor models across samples in Inner Mongolia

Despite the three-factor model found for clinically depressed patients in Inner Mongolia in Study 1, a four-factor structure was found to be the best-fit model for pregnant women in Study 2. The three-factor structure, however, was not supported on Confirmatory Factor Analysis (CFA) for the pregnant sample (study 2). Instead, the two weaker factors (cognitive-interpersonal and somatic) were highly correlated such that combining them into one single factor was more appropriate for CFA, giving rise to a factor structure with mixed symptoms. In addition, high factor loadings (>0.7) were found for symptoms in the four-factor structure, indicating a good correlation between the latent factors and its symptoms.

It can be drawn from the results of study 1 of the cultural characteristics of depressive symptom pattern leading towards the possibility of developing a scale that contains subscales of mixed symptoms. Similar to the factor structure found for the CES-D by Yen et al. (2000), interpersonal symptoms merged with cognitive and affective symptoms. It highlighted a greater contribution of interpersonal dimensions to symptom patterns than in previous studies such as the findings reported by Ying (1988, 2000). The finding suggested that interpersonal symptoms could play a greater role in the symptom pattern of Inner Mongolian individuals. Emerging in the same factor with cognitive symptoms with high factor loadings, this suggests that a negative view of self and the surroundings, as well as malfunctioning interpersonal relationships, were expressed in the depressive symptom pattern. However, a best-fit four-factor structure of the Chinese-MDAS when used with pregnant women in Inner Mongolia could suggested that pregnant women in Inner Mongolia report and recognize depressive

symptoms in each domains. A mixed somatic and affective factor could indicate the mind-body integration of Chinese culture and evidence of somatization (Ying et al., 2000). The result of CFA model fit provided greater support for a clear-cut four-subscale structure in CFA was found in pregnant Inner Mongolia women. This could suggest less effect of somatization in pregnant women than in clinically depressed inpatients. A possible explanation could be due to pregnancy itself. A great source of discomfort comes with somatic complaints and pregnancy such that women could focus more on psychological symptoms. It is likely that most pregnant women in study 2 were in late pregnancy so that they had already accepted the bodily changes as part of their pregnancy and were more willing to report emotional and cognitive symptoms of depression. However, both studies did not directly measure somatization. It is still possible that Chinese pregnant women may experience somatization as part of the depressive symptoms, even though they may have interpreted it part of the pregnancy. The role of somatization in depression vs. pregnancy is indeed an important topic for future studies. This will be discussed in further details below.

In addition to a weaker effect of somatization found in study 2, it also provided greater support for a more clear-cut structure of symptoms that resembles the factor structure found in Western populations and the use of subscales in assessing severity of depression in various domains. As the findings shown in study 3, different risk factors are associated with each subscale of the MDAS. The findings provided support for the argument that antenatal depression shares similar clinical presentations with general depression (reviewed in chapter 2). The results are coherent with the symptoms of perinatal depression specified by the UK National Institute for Clinical Excellence Institute (National Institute of Clinical Excellence (NICE), 2004) including: low mood and losing enjoyment, anxiety, sleep disruption and disturbed eating patterns, poor concentration, low self-esteem, low energy levels, and loss of libido. This result is partly consistent with the latest revision of DSM-5 that perinatal depression presents similar clinical characteristics to depression that occurs at any time of life (APA, 2013).

In addition, the EFA was conducted on clinical sample in study 1 while the comparison of models by CFA was conducted on community pregnant women. There are confounding factors included sample characteristics (clinical vs. community; general population vs. pregnant women; gender), sample size and exposure to different risk factors. These factors could give rise to a discordant result as in study 1. Moreover, the four-factor model of MDAS is theory driven, developed based on theories of depression and clinical experience. It is likely to be the best model to measure depression severity in various cultural groups. It is also in line with previous findings that pregnant women also recognizes psychological, cognitive, and interpersonal symptoms as much as somatic ones (Adeponle, Groleau, Kola, Kirmayer, & Gureje, 2017; Brodey et al., 2016).

7.3.2 Somatic symptoms as indicators of antenatal depression

In pregnant women, somatic symptoms of depression have been at the centre of controversy about antenatal depression screening. Despite being the dominant trend in the research into depression in Chinese samples, somatization is not obvious in the factor structure of the Chinese-MDAS for the clinical sample, in that a factor with mixed somatic and emotional symptoms was not extracted. This result contradicts the argument of Nikelly (1992) that revealing affective distress is discouraged in collectivist cultures. By doing so an individual may appear self-centered, causing harm to close relationships (Kanazawa, White, & Hampson, 2007). Kleinman and Kleinman (1991) also postulated that the Cultural Revolution embedded the stigma of mental disorder deep in ideological and even political aspects. People thus denied affective distress and other related emotions of mental disorder, which were usually replaced with somatic symptoms. For example, a comparison between Chinese and Australian depressed individuals documented that the Chinese tend to somatise depression while the Westerners emphasized emotion and cognition (Parker, Hilton, Hadzi-Pavlovic, & Bains, 2001). By contrast, study 1 found that Chinese depressed patients primarily reported and recognized affective symptoms because somatic symptoms do not

emerge in the strongest factor, but are extracted as a weaker second factor instead. This could indicate that somatic symptoms are not a prominent feature in self-reported depressive symptoms in this studied population. A mixture of somatic and affective symptoms has been observed in previous ethnographic and clinical research (Cheung, 1982; Cheung et al., 1985), which suggests that Chinese people might minimize the difference between depressive and somatic symptoms in their reports of distress. Factor 3 in study 1 was composed mostly of somatic symptoms and several cognitive symptoms (unable to make decision, poor memory, unable to plan things, feeling disorganized, and unable to care for myself) and an interpersonal symptom (decrease in activity). The results indicate a close relationship between these symptoms. Alternatively, it could mean that Chinese depressed patients interpret these cognitive and interpersonal symptoms as somatic.

The findings of study 2 add to the debate about assessing somatic symptoms during antenatal depression in a Chinese pregnant population. The MDAS demonstrated a sufficient psychometric performance with pregnant women in study 2, including a more adequate model fit for a four-factor model over a three-factor model obtained from study 1 on CFA including a separate somatic domain of depression. The result supports the proposal that not all somatic symptoms need to be eliminated. Indeed, it is a challenge to draw a clear line between the somatic symptoms of depression and the natural features of pregnancy. The validity of somatic symptoms as indicators of antenatal depression has been widely debated. Wisner et al. (1994) indeed reported insignificant differences in the severity of somatic symptoms during and outwith pregnancy. Krause, Bombardier, and Carter (2008) also found that the presence of a somatic factor does not suggest that they should be eliminated in assessment. Somatic symptoms could provide potentially relevant information such as depression severity (Yonkers et al., 2009). Removing them could result in the misattribution of depressive symptoms as normal pregnancy experience, and overlook the possibility of depressive disorder (Sidebottom et al., 2012). Evidence shows that pregnancy itself does not seem to overly complicate the diagnosis of depression. Potential evidence also may indicate good psychometric characteristics of the BDI for pregnant populations despite the

presence of somatic symptoms. Similarly, Rochat et al. (2011) included sleep problems (especially difficulty in falling asleep and middle insomnia) in the clinical presentation of depression in rural South African pregnant women. Somatic symptoms were frequently reported but were not found to overestimate the level of depression in this sample, a result coherent with that of Kammerer et al. (2009). They found that pregnant women often described depression in terms of its impact on their emotions, their interactions with others, and their daily functioning (Rochat et al., 2011). In line with this finding, Yonkers and colleagues (2009) reported the predominance of somatic symptoms in the early stage of pregnancy. Pregnant women endorse most somatic symptoms, including changes of sleep, energy, and appetite at a considerably higher rate in the first trimester compared to later trimesters. In particular, women who confirmed the presence of depressed mood and anhedonia were found to have a greater tendency to endorse somatic symptoms. The results of Rochat et al.'s (2011) thus pointed to the importance of somatic symptoms in identifying antenatal depression, especially in the first trimester. This is in line with the study by Ross, Evans, Sellers, and Romach (2003) which showed that somatic complaints made by pregnant women are related to the severity of mood disorder during the pregnancy.

To date, the EPDS, with all somatic symptoms eliminated, has been the most popular self-report scale for use during pregnancy (Yonkers et al., 2009). However, the Chinese-MDAS was shown in study 2 to be significantly correlated with the EPDS and BDI although it comprises a comprehensive subscale of somatic symptoms, This suggests that despite the presence of somatic items, the scale could also perform as effectively as other self-report measures. In particular, the somatic sub-scale of the Chinese-MDAS is also statistically associated with the BDI and the EPDS. This finding supports the argument that it is worth considering the retention of certain somatic symptoms in self-report questionnaires, as they may have good validity in measuring depressive severity in pregnant women. In fact, Nylen et al. (2013) pointed out the importance of checking somatic symptoms as valid indicators of depression. The study showed improved validity of assessment to fully reflect the severity of depression when valid somatic symptoms are included. Thus, a valid self-report

instrument should include all relevant symptoms and several indicators for each symptom. In their study, they examined the factor structure of the Inventory of Depression and Anxiety Symptoms (IDAS) (Watson et al., 2008; Watson et al., 2007) and compared the factor loadings of somatic items in pregnant and non-pregnant groups. The IDAS revealed a similar factor structure of depressive symptoms across pregnant and community samples. The findings suggested that symptoms of fatigue and of sleeping problems are valid indicators of depression in pregnant women, while appetite changes are invalid indicators of depression during pregnancy. These results refuted claims that all somatic symptoms are normative pregnancy experiences, despite a higher endorsement of somatic symptoms in pregnant women. Indeed, a growing body of research has started to reveal that depression symptoms during pregnancy are as prevalent outwith pregnancy. Consistent with this finding, Apter et al. (2013) also reported a higher risk for depression for women who endorse a high number of somatic complaints during pregnancy. This finding deviated from a traditional perspective that an increase in somatic symptoms expressed can be attributed to pregnancy itself. Apter et al. (2013) found that women with higher EPDS scores expressed a much higher number of somatic complaints, suggesting the somatic symptoms could increase as depression becomes more severe.

The somatic dimension is as important as other dimensions of depressive symptoms in self-reported measures for pregnant women, which are the centre of focus in this thesis. Self-report questionnaires help clinicians and researchers to identify people who may be experiencing depressive symptoms, which can then be further explored in clinical interviews. They are important in initial screening at antenatal check-ups. Indeed, there are criticisms that false positives could result from including somatic symptoms in depression scales. However, untreated antenatal depression has severe negative consequences. The inclusion of somatic symptoms in the scale is thus a necessary trade off that it can ensure that this aspect is not missed. Later clinical interviews will be able to distinguish whether the somatic complaints are likely to be caused by pregnancy or are genuine indicators of depression. Wong and colleagues (2012) also confirmed that social and somatic domains have comparably high reliability and validity as affective and cognitive domains, and that strong inter-

correlations suggest their similarity and equal potential to effectively measure depression. One important issue arising from their study was that respondents in the mild-moderate depressive severity score range tended to have somatic or social scores contributing to a discrepantly large component of their overall score. This finding highlights the importance of somatic and social domains of depression that may predominate in the earlier or milder stage of depression, whereas psychological expressions predominate when the severity of depression increases. As a result, scales with culturally-sensitive symptoms are useful in identifying patients with a milder severity of depression, by increasing the screening efficacy. The translation and validation of the MDAS could potentially enhance screening efficacy due to its cultural-related comprehensive subscale of an interpersonal dimension, which could be a valid indicator for distinguishing depressed from non-depressed individuals in the moderate and mild zone of depression severity. In particular, the more appropriate fit of the four-subscale structure on CFA supported the use of each subscale separately to indicate depressive severity in various domains of depression symptoms.

7.3.3 The role of interpersonal symptoms in depression in Chinese pregnant women

Chapters 1 and 2 highlight that interpersonal harmony is an important element in traditional Chinese culture. As Inner Mongolia is a more collectivist and less individualistic area than many provinces of China, residents are under greater influence from traditional expectations of interdependence and interpersonal harmony than those living in more individualistic areas such as Hong Kong and Shanghai. The emphasis on interdependence and emotional restraint could be an important reason for Chinese people to express social disharmony and dysfunction in their social roles.

The results of the three studies provide support for a cultural influence on the depressive symptom profile from interpersonal symptoms. In study 1, interpersonal symptoms emerged in the second factor. The fact that emotional symptoms emerged

in the same factor as interpersonal symptoms could suggest that depressed Chinese individuals may experience depressed affect from social difficulties. This result from the factor structure in a Chinese population could suggest a close connection between social context, interpersonal functioning and negative cognition (self-blame, feeling a failure) in depression. It could provide evidence for the tendency among Chinese individuals to express their depressive affect as socially contextualised issues compared to the general population. In factor 2 of study 1, not only did interpersonal symptoms relate to the negative self, but also social environment and social relationships emerged in the sample factor, together with emotional symptoms as shame and guilt, and cognitive symptoms such as feeling a failure and ruminations. The mixed interpersonal/cognitive factor highlighted an integration of Inner Mongolian individual's self-definition and interpersonal relationships that could lead to their distress. There is a similar finding on pregnant populations (Furber et al.,2009) which suggested that pregnant women with depression reported feeling socially anxious and avoidant. Although the mixed factor was less well-fit in study 2, support for the subscale of interpersonal symptoms supported the importance of assessing interpersonal symptoms in pregnant Chinese women. This shields lights on future direction in clarifying the role of interpersonal symptoms in depression symptom profile.

Assessing interpersonal symptoms in depression scales is useful for Inner Mongolian pregnant women because stigma plays a bigger role during pregnancy than at other times in China. As it is a period when pregnant women are expected to show joy and excitement about their baby, depressed pregnant women could be too embarrassed to express their distress. Indeed, larger levels of stigma have been found in a collectivistic culture. Papadopoulos, Foster, and Caldwell (2013) compared stigmatising attitudes across various ethnic groups (American, White-English, Greek/Greek Cypriot, and Chinese). They linked greater stigmatizing attitudes to higher scores of collectivism. In particular, the Chinese were found to be more stigmatising. A more collectivistic culture which embraces greater stigmatizing attitudes could imply that individuals experience greater stigma in expressing their mental illness, which in turn may play a

role in the expression of depression.

7.4 The Chinese environment and the link to depressive symptoms

Chapters 1 and 2 discussed in detail the cultural, social and economic environment that the Chinese general population and pregnant women have been experiencing. The results of study 3 found some evidence to support the link between Inner Mongolian women's depressive symptom and their social context. The three studies generate a picture of cultural characteristics of depressive symptoms in China.

Many of the demographic risk factors that have been shown in previous studies, such as young age and gestation week (Lancaster et al., 2010) were found not to be significant predictors for depressive symptoms in study 3. In fact, most participants were aged above 25. The majority of them were well-educated, with a full-time job and half of them worked in a professional field. In other words, participants recruited in this thesis research were skewed towards a higher socioeconomic class. This phenomenon matches China's maternity policy since the 1980s. Women have been encouraged to get pregnant after the age of 24 so that they could be entitled to longer maternity and paternity leave, as well as to other benefits. Naturally, most women above 24 years old in China would have finished university education. This explains why 75% of participants held a bachelor's degree. In addition, giving birth to a baby is the whole family's issue rather than only the couple's concern (Lee, 2000). In Chinese families, the child becomes the top priority to be taken care of under the one-child policy. Each couple only has one chance. In the light of this, most couples would ensure most resources to be put into childcare. It is therefore likely that women obtain more secure financial status before they get pregnant. This could be the reason that over half of the participants worked in a professional field.

Despite their greater secure financial security and older age, 35% of women were found to score above the cut-off value of 9/10 in EPDS, almost three times the prevalence rate recorded in previous studies (9.8 to 13.5%) (Heron, O'Connor, Evans, Golding, & Glover, 2004) and twice that (18.5%) in research reviewed by Gavin et al. (2005). This high prevalence of antenatal depression could be related to the argued disadvantaged social and occupational environment that Chinese women are living in. In particular, 82.5% of pregnant women are in full-time employment. Over half of the sample worked in their profession for an average 39 hours per week. Given that more than 90% of pregnant women in study 2 were in their third trimester, the numbers could be linked to the current unfavourable employment situation and maternity policy in China. Women may fear they would become less competitive and tend less to take medical leave. It is not unusual for Chinese women to work until prior to labour. This is because the law entitles pregnant women in Mainland China to at least 98 days of maternity leave, which can be divided up into 15 days of paid leave during pregnancy and 83 days after delivery, or a 98-day leave during the postpartum period. It explains the demographic statistics that women in study 2 and study 3 are still working in late pregnancy. However, women after 28 weeks of pregnancy can take half-paid maternity leave with their employers' permission. It is also likely that expensive childcare and education puts great financial stress on women so they continue to work during the third trimester.

Indeed, the finding of study 3 highlighted the significant contribution work-family conflict (WFC) has on antenatal depression. WFC has never been examined as a risk factor for antenatal depression on pregnant women in China. The finding of this study extended existing knowledge of the impact of WFC. The general population of Chinese women are subjected to gender-based division of domestic duties and the expectation for them to prioritize family over their career due to traditional values of Confucian ideology. On the other hand, they are expected to work full time in workplaces to hold up "half the sky" (Xiao & Cooke, 2012). In line with this, the work-family balance for Chinese women is strained by traditional Confucian values and economic change (Foster & Ren, 2015). Moreover, Xiao and Cooke (2012) postulated

that Chinese women experience greater WFC than men in managerial and professional level due to disproportional domestic responsibilities and high expectations of work performances from employers. For pregnant women, it is also possible that work-family conflict becomes more intense in the third trimester as women have to cope with more pregnant-related symptoms, normal anxiety about birth, and changing roles and work on top of that. Significant association between WFC and total score of cognitive subscale could indicate that it gave rise to negative and depressive thinking of not being capable in both professional and family spheres. Yet organizational support including counselling service is shown to be insufficient or absent (Xiao & Cooke, 2012). Added to that, emotional and physical support from significant others are thus crucial during pregnancy for Chinese pregnant women. This result could explain the important role of perceived emotional support and physical support associating significantly with an increase in depressive symptoms in various domains. Insufficient emotional support contributes to overall depressive symptoms and cognitive symptoms whereas physical support contributed to elevated emotional and somatic symptoms. The result points to future direction that organizations could consider policies to better look after pregnant employees.

Moreover, the dual worker/carer family model in China may link to self-esteem being the most salient and significant predictor of depressive symptoms. The perception of ideal women are imposed on Chinese women as competent in professional sphere and in taking care of their families (Xinhuanet, 2001). It provided a possible explanation for self-esteem being a salient risk factor for antenatal depression in Inner Mongolian Chinese pregnant women. Women with more positive self-perception and those who see themselves on top of work and family responsibilities are less likely to experience depression during pregnancy. Another likely explanation could be due to the interdependency of Chinese people, especially women, within their social groups. Hence, their self-definition and distress are closely related to their social context and more attention is paid to interpersonal relationships (Triandis, 2011). This effect could be particularly strong for pregnant women, who perceive themselves as having great

responsibility for family and the foetus. Their self-definition integrates with the family context and the work setting and affects their depressive symptom pattern.

7.5 Limitations and Future Directions for Research

The studies presented in this thesis possess several limitations that could be addressed in future research. Studies 1 employed exploratory factor analysis to examine the symptom profile of Inner Mongolian clinically depressed patients. This method is subject to limitations in that factor structures vary across and within symptomatic instruments. Even with the same dataset, using different depression measure could result in a different number and nature of factors even when the same analytic and rotation methods are used (Fried, 2014). Secondly, using different approaches to extract factors could also lead to a divergent factor structure in the same dataset (Courtney, 2013). Hence, future studies are recommended to investigate the factor structure of the MDAS on populations across cultures. This could facilitate the comparison of symptom patterns and give rise to a clearer picture of the cultural characteristics of symptom profiles. In addition, the current study made an assumption, based on previous research, that China has been recognized as one of the most collectivistic countries in the world (Suh et al., 1998). The findings were compared to previous literature on the factor structure of other depression measures and indicated the possibility that interpersonal symptoms of depression could characterize a cultural expression of depression. In future cross-cultural research concerning both Chinese and Western samples, it will be important to measure individualism and collectivism and examine its relationship with depressive symptom patterns directly.

Secondly, in Study 2, the pregnant sample is skewed towards a higher socioeconomic class. The majority of women (>95%) were aged above 25. Most of them have a bachelor's degree or higher qualification (82.9%) and over half of them work in professional settings (52.6%). In contrast with previous findings that link antenatal depression to poor education, unemployment, job insecurity and financial strain, the

participants in this study are more likely to mobilize better resources, obtain more information on antenatal depression on the Internet and find greater social support on online forums, compared with women with a lower social status, educational level and skills. The latter are more replaceable in their jobs and face more difficulties in finding a new job, resulting in greater financial insecurity and stress during pregnancy. These issues are reviewed in Chapter 2 (section 2.4.2) and these women face greater challenges during pregnancy. This skewness in the sample could explain the non-significant association between antenatal depression and risk factors studied in chapter 6. Results from this thesis may not be generalised into populations with other demographic characteristics. Future studies should be more balanced in terms of socio-economic class to provide a more accurate account for the risk factors for depression during pregnancy in Inner Mongolia.

The majority of pregnant women recruited in study 2 were mostly in their third trimester with a mean gestation week of 35 weeks. The results are thus more focused on symptomatology and risk factors in the third trimester, making it difficult to generalize them to women at earlier stages of pregnancy. Antenatal depression in earlier trimesters may have various symptom presentations and sets of risk factors, in particular when most of the women will still be working and at the same time, are still expected to carry out family duties. Further research could be conducted by recruiting a comparable number of participants in all three trimesters to compare their symptom patterns and risk factors for depression. A longitudinal study could be utilized to track the change in symptoms across trimesters. Women in the postpartum period could also be included in symptom comparisons. This could address the debate about differences in symptoms between antenatal and postnatal depression.

Thirdly, as participants completed the three depression scales in the same order (first administered was the MDAS, followed by the BDI and EPDS), participants may have a better understanding of the EPDS and BDI after immediate experience of responding to the MDAS. The possible bias of "order effect" should be controlled in future studies

by randomizing the order of administration of the three scales (Huguet & Miró, 2008; Perreault, 1975). In addition, the investigation carried out in Chapter 6 only included a restricted number of risk factors. It could overlook a number of other variables, especially personality characteristics (high neuroticism score, negative cognitive attributional style) which also have an influence on the expression of interpersonal symptoms of depression (Leigh & Milgrom. 2008). Indirect interpretation from the social support scale was obtained regarding the relationship between mother and daughter-in-law. Indeed, direct measures of family and marital conflict, especially between mothers and daughters-in-law could also be explored because it remains an important risk factor for antenatal depression (Lau et al., 2011).

Furthermore, the depression sample in study 1 and the pregnant sample in study 2 were obtained at different hospitals in the same city. The pregnant sample recruited in studies 2 and 3 is a community, rather than a clinical sample, which could give rise to variations in the presentation of depression. The clinically depressed sample participants were formally diagnosed through structured interviews by psychiatrists, whereas the depressed pregnant sample participants were identified using the EDPS cut-off value, which was first developed to measure depression severity rather than as a diagnostic tool. Although it possesses high sensitivity and specificity for the cut-off value, a diagnostic interview as SCID and MINI could be applied in future studies to validate the prevalent rate of antenatal depression, as a generally higher prevalence rate is obtained using self-report questionnaires.

The final limitation in study 2 is in the sample size. Study 2 recruited 234 participants. Guidance for an adequate sample size (N) for factor analysis included but is not limited to: $N \geq 200$, ratio of N to the number of variables in a model (p), $N/p \geq 10$; the ratio of N to the number of model parameters (q), $N/q \geq 5$; and an inverse relationship between construct reliability and adequate N. While the rule of thumb of sample size is still under discussion, a sample size of 200 is considered as the minimum requirement by many researchers (Kline, 2005). Muthén and Muthén (2002) suggested N=150 for a reasonable CFA under normal distribution of indicator variables and the absence of missing data. Kline (2005) pointed out the need for 100 cases/observations for each

group in a multi-group modelling. Similarly in study 1 (N=171), although the KMO in EFA indicated an adequacy of the sample size study 1, increasing the sample size could result in a more robust good fit of the model in support of the hypothesis of cultural characteristics of depressive symptoms. In seeking for the best model fit of MDAS in pregnant Chinese women, EFA is an advantages first step for the highly skewed responses on the MDAS that the community sample generated, as most participants experienced very little mood disturbance. A larger sample could thus allow a split into random halves for both EFA and CFA to be conducted on the same pregnant sample. In doing so fewer confounding variables between clinical and pregnant sample could result to provide a clearer picture on best model fit of MDAS.

To facilitate better screening of depression during pregnancy in future, a longitudinal approach across trimesters as well as during the postpartum period would allow a better understanding of symptom change. Symptoms, especially somatic complaints, are influenced by gestational age and delivery (Zhong et al., 2014). A longitudinal approach also might allow investigation into the causal relationship between antenatal depression and risk factors. Indeed, analysis of the psychometric properties of MDAS on clinical and pregnant samples in the thesis lay within the framework of classic test theory (CTT), while Item Response Theory (IRT) could be used in future studies on the MDAS or item level comparisons. Regarding cultural characteristics of depression expression, comparison between different cultural groups using multi-group modelling could provide more information on the cultural differences. This will be the future area of study.

7.7 Conclusions

The three studies together provide insights into how depression is experienced in clinical samples and pregnant women in China. Chinese cultural values and social environments are reflected in the cultural expressions of depressive symptoms. While the Western conceptualization of depression shows great validity across cultures, namely that the core symptoms of depression remain universal for diagnosis, this thesis provides unique information on the variation in the factor structure of depression when used with Inner Mongolian samples. It also presents the data from the validation study of the Chinese-MDAS with a comprehensive interpersonal symptom checklist which will be an asset to future research in Chinese clinical and pregnant populations. Studying the risk factors for depression highlights significant contributions of self-esteem and job stress in antenatal depression in China. This suggested that maternity and employment in Chinese women should become the future direction of research.

Pregnant women recruited at the time of the study had experienced three decades of the implementation of the one-child policy. In 2015 the policy was relaxed so that each couple is now allowed to have two children. This change is due to severe skewing in the generational and gender proportions of the population and the shrinkage of the nation's population of working age adults, threatening cheap labour resources. Although the people's reaction to the new policy is not known yet, pregnant women in China face changes in their social environment. In particular, the two-child policy could eliminate women's anxiety about producing a boy for the family. These will become important issues that influence the pregnancy experience of Chinese women and should be addressed in future studies.

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Appendices

Appendix A Mean, standard deviation, skewness and kurtosis of the Chinese MDAS

MDAS Item	Mean	Std. Deviation	Skewness		Kurtosis	
			Statistic	Std. Error	Statistic	Std. Error
Item 1	3.43	1.12	-.26	.19	-.80	.37
Item 2	2.81	1.16	.19	.19	-.84	.37
Item 3	3.29	1.15	-.36	.19	-.65	.37
Item 4	2.97	1.29	-.11	.19	-1.12	.37
Item 5	3.46	1.17	-.45	.19	-.68	.37
Item 6	2.40	1.18	.30	.19	-1.12	.37
Item 7	3.31	1.20	-.43	.19	-.62	.37
Item 8	3.28	1.23	-.37	.19	-.79	.37
Item 9	2.51	1.11	.37	.19	-.79	.37
Item 10	2.97	1.14	-.11	.19	-.84	.37
Item 11	1.71	1.05	1.51	.19	1.47	.37
Item 12	2.72	1.16	.14	.19	-1.00	.37
Item 13	2.63	1.28	.20	.19	-1.16	.37
Item 14	3.18	1.34	-.31	.19	-1.03	.37
Item 15	3.22	1.30	-.44	.19	-.92	.37
Item 16	2.93	1.37	-.04	.19	-1.30	.37
Item 17	2.82	1.40	.03	.19	-1.35	.37
Item 18	3.00	1.20	.04	.19	-.94	.37
Item 19	2.70	1.19	.20	.19	-.91	.37
Item 20	2.89	1.37	-.03	.19	-1.29	.37

Item 21	2.85	1.30	.05	.19	-1.15	.37
Item 22	2.87	1.26	.11	.19	-1.00	.37
Item 23	2.26	1.21	.79	.19	-.29	.37
Item 24	2.73	1.17	.21	.19	-.79	.37
Item 25	3.23	1.17	-.23	.19	-.74	.37
Item 26	3.22	1.25	-.21	.19	-.92	.37
Item 27	2.78	1.26	.06	.19	-1.06	.37
Item 28	2.98	1.31	-.02	.19	-1.09	.37
Item 29	2.75	1.23	.19	.19	-.98	.37
Item 30	3.28	1.15	-.31	.19	-.77	.37
Item 31	2.42	1.18	.36	.19	-.90	.37
Item 32	2.37	1.16	.53	.19	-.70	.37
Item 33	3.08	1.28	-.18	.19	-1.07	.37
Item 34	2.71	1.20	.19	.19	-.85	.37
Item 35	2.36	1.21	.68	.19	-.40	.37
Item 36	2.49	1.26	.44	.19	-.88	.37
Item 37	2.89	1.25	.05	.19	-1.00	.37
Item 38	2.90	1.30	.15	.19	-1.04	.37
Item 39	2.76	1.29	.11	.19	-1.16	.37
Item 40	2.78	1.32	.11	.19	-1.20	.37
Item 41	2.95	1.27	.00	.19	-1.00	.37
Item 42	2.44	1.28	.41	.19	-.96	.37
Item 43	2.79	1.23	.01	.19	-1.02	.37
Item 44	2.54	1.19	.37	.19	-.77	.37
Item 45	2.81	1.14	.13	.19	-.72	.37
Item 46	2.45	1.16	.34	.19	-.81	.37

Item 47	2.37	1.18	.56	.19	-.62	.37
Item 48	1.91	1.10	1.23	.19	.87	.37
Item 49	2.79	1.20	.13	.19	-.93	.37
Item 50	2.67	1.28	.20	.19	-1.12	.37
Item 51	2.76	1.26	.23	.19	-.93	.37
Item 52	2.11	1.18	.90	.19	-.079	.37

Appendix B Translated and back-translated MDAS

MDAS Items	Chinese Translation	Back Translation
1 Low mood	情绪低落	Low in mood
2 Sadness	悲伤	Sad
3 Low spirits	精神不振	Low spirit
4 Gloominess	沮丧	Disheartened
5 Sad mood	心情忧郁	Depressed
6 Guilt	内疚	Guilt
7 Unhappiness	不快乐	Unhappy
8 Not cheerful	不愉快	Not cheerful
9 Irritable mood	暴躁易怒	Irritated
10 Dysphoric mood	烦躁不安	Dysphoric
11 Shame	羞耻	Shame
12 Anxiety	紧张	Anxious
13 Feelings of hopelessness	绝望	Hopeless
14 Loss of interest	对事物失去兴趣	Loss interest in things
15 No pleasure	找不到乐趣	Can't find pleasure in things
16 The future feels bleak	感觉未来渺茫	Feel no hope for future
17 Feeling worthless	觉得自己没有价值	Feel worthless
18 Poor concentration	注意力不集中	Difficult to concentrate

19 Self-blame	责备自己	Blame oneself
20 Life feels meaningless	感觉人生没意义	Feel that life is meaningless
21 Feeling a failure	觉得自己失败	Feel that oneself is a failure
22 Ruminations	反复回想自己的悲伤和让自己悲伤的事情	Hold on to and linger on negative thoughts
23 Thoughts of suicide	有自杀念头	Have suicidal thoughts
24 Unable to make decision	很难做决定	Difficult to make decision
25 Low energy	没有精力	Low level of energy
26 Problems with sleeping	睡眠出现问题	Sleep problem
27 Change in appetite	胃口改变	Change in appetite
28 Lower sex drive	性欲减低	Decreased sex drive
29 Feel slowed down	动作语言减慢	Become slower in speech and motion
30 Fatigue	疲倦	Fatigue
31 Change in weight	体重改变	Change in weight
32 Crying	哭泣	Cry
33 Agitation	烦乱	Agitated
34 Slowed movement	动作缓慢	Slow in movements
35 More pain sensitivity	对疼痛反应更敏感	Higher pain sensitivity
36 Intestinal problems	消化能力下降	Decrease in digestion

37 Decrease in activities	活动能力下降	Reduced activities
38 Social withdrawal	脱离社交活动	Withdraw from social activities
39 Feeling worse than others	觉得自己比别人差	Feel worse than others
40 Feel a burden on others	觉得自己是别人的负担	Feel like a burden on others
41 Social avoidance	逃避社交活动	Avoid social activities
42 Feeling undeserving of others care	觉得自己不值得别人的关心	Feel that oneself does not deserve others' care
43 Hypersensitive to criticism	对别人的批评过度敏感	Over-sensitive to criticism
44 Feeling less attractive than others	觉得魅力比别人少	Feel less attractive than others
45 Feel too sensitive to others	对别人的语言行为太过敏感	Over-sensitive to people's behaviors and comments
46 Feeling let down by others	觉得别人让自己失望	Feel let down by others
47 Unable to love others	难以爱别人	Hard to love others
48 Aggression towards others	对别人有敌意	Feel hostile towards others
49 Poor Memory	记忆力下降	Decreased memory capacity
50 Unable to plan things	无法做出规划／计划	Difficult to plan things
51 Feeling disorganized	感觉杂乱无章	Feel disorganized
52 Unable to care for myself	无法照料自己	Difficult to take care of oneself

Appendix C Exploratory Factor Analysis (EFA) of MDAS on clinical sample in study 1 by FACTOR

F A C T O R

Unrestricted Factor Analysis

Release Version 10.3.01 x64bits
July, 2015
Rovira i Virgili University
Tarragona, SPAIN

Programming:
Urbano Lorenzo-Seva

Mathematical Specification:
Urbano Lorenzo-Seva
Pere J. Ferrando

Date: Friday, August 12, 2016
Time: 21:40:9

DETAILS OF ANALYSIS

Participants' scores data file	: F:\All datasets\final dataset study 1 Chinese2.dat
Method to handle missing values	: Hot-Deck Multiple Imputation in Exploratory Factor Analysis (Lorenzo-Seva & Van Ginkel, 2015)
Missing code value	: 9
Number of participants	: 171
Number of participants without missing data	: 155
Number of variables	: 52
Variables included in the analysis	: ALL
Variables excluded in the analysis	: NONE
Number of components	: 3
Number of second order components	: 0
Procedure for determining the number of dimensions (MAP) (Velicer, 1976)	: Minimum Average Partial
Dispersion matrix	: Polychoric Correlations
Method for components extraction Analysis	: Principal Components
Rotation to achieve factor simplicity	: Promax
Value of parameter k	: 4.0000
Clever rotation start	: Raw Varimax
Number of random starts	: 10
Maximum mumber of iterations	: 100
Convergence value	: 0.00001000

UNIVARIATE DESCRIPTIVES

Variable	Mean	Confidence Interval (95%)	Variance	Skewness	Kurtosis (Zero centered)

V	1	3.465	(3.24	3.69)	1.216	-0.272	-0.721
V	2	2.826	(2.59	3.06)	1.292	0.161	-0.800
V	3	3.329	(3.10	3.56)	1.279	-0.351	-0.636
V	4	2.981	(2.71	3.25)	1.671	-0.108	-1.121
V	5	3.484	(3.24	3.73)	1.372	-0.458	-0.666
V	6	2.432	(2.19	2.68)	1.394	0.270	-1.117
V	7	3.342	(3.10	3.59)	1.412	-0.432	-0.557
V	8	3.303	(3.05	3.56)	1.515	-0.407	-0.735
V	9	2.516	(2.29	2.74)	1.179	0.324	-0.844
V	10	2.987	(2.75	3.22)	1.303	-0.184	-0.860
V	11	1.690	(1.48	1.90)	1.040	1.533	1.518
V	12	2.748	(2.51	2.99)	1.337	0.025	-1.039
V	13	2.626	(2.36	2.89)	1.602	0.214	-1.111
V	14	3.194	(2.92	3.47)	1.808	-0.325	-1.035
V	15	3.271	(3.01	3.54)	1.656	-0.499	-0.822
V	16	2.929	(2.65	3.21)	1.872	-0.054	-1.288
V	17	2.826	(2.54	3.11)	1.963	0.030	-1.345
V	18	2.987	(2.74	3.24)	1.458	0.047	-0.952
V	19	2.652	(2.41	2.89)	1.375	0.199	-0.902
V	20	2.865	(2.58	3.14)	1.846	-0.016	-1.259
V	21	2.813	(2.55	3.08)	1.649	0.078	-1.113
V	22	2.871	(2.61	3.13)	1.596	0.071	-1.021
V	23	2.232	(1.98	2.48)	1.469	0.815	-0.247
V	24	2.735	(2.49	2.98)	1.382	0.215	-0.757
V	25	3.252	(3.01	3.49)	1.350	-0.279	-0.680
V	26	3.245	(2.99	3.50)	1.579	-0.256	-0.900
V	27	2.787	(2.53	3.04)	1.535	0.022	-1.068
V	28	3.052	(2.79	3.32)	1.662	-0.079	-1.064
V	29	2.774	(2.52	3.03)	1.504	0.164	-0.980
V	30	3.297	(3.06	3.53)	1.305	-0.393	-0.626
V	31	2.413	(2.17	2.66)	1.430	0.390	-0.892
V	32	2.329	(2.09	2.56)	1.305	0.583	-0.598
V	33	3.103	(2.85	3.36)	1.551	-0.217	-0.987
V	34	2.652	(2.41	2.89)	1.388	0.204	-0.848
V	35	2.361	(2.11	2.61)	1.469	0.677	-0.431
V	36	2.452	(2.19	2.71)	1.564	0.469	-0.855
V	37	2.852	(2.60	3.10)	1.468	0.069	-0.916
V	38	2.903	(2.64	3.17)	1.675	0.127	-1.030
V	39	2.716	(2.45	2.98)	1.661	0.160	-1.136
V	40	2.735	(2.46	3.01)	1.730	0.156	-1.161
V	41	2.935	(2.67	3.20)	1.635	0.010	-0.996
V	42	2.426	(2.16	2.69)	1.599	0.390	-0.963
V	43	2.748	(2.50	3.00)	1.492	0.043	-1.013
V	44	2.529	(2.29	2.77)	1.385	0.408	-0.708
V	45	2.800	(2.57	3.03)	1.283	0.159	-0.705
V	46	2.445	(2.21	2.68)	1.344	0.347	-0.781
V	47	2.348	(2.11	2.59)	1.388	0.558	-0.618
V	48	1.865	(1.64	2.08)	1.136	1.302	1.119
V	49	2.794	(2.55	3.04)	1.428	0.131	-0.913
V	50	2.710	(2.45	2.97)	1.625	0.145	-1.117
V	51	2.787	(2.52	3.05)	1.639	0.200	-0.981
V	52	2.052	(1.81	2.29)	1.326	0.995	0.183

MULTIVARIATE DESCRIPTIVES

Analysis of the Mardia's (1970) multivariate asymmetry skewness and kurtosis.

	Coefficient	Statistic	df	P
Skewness	1213.688	31353.596	24804	1.0000
SKewness corrected for small sample	1213.688	31983.650	24804	1.0000
Kurtosis	3011.783	16.927		0.0000**

** Significant at 0.05

STANDARIZED VARIANCE / COVARIANCE MATRIX (POLYCHORIC CORRELATION)
(Polychoric algorithm: Olsson ,1979a, 1979b; Tetrachoric algorithm: AS116)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
V 1	1.000																																																			
V 2	0.613	1.000																																																		
V 3	0.601	0.601	1.000																																																
V 4	0.621	0.673	0.711	1.000																																														
V 5	0.719	0.583	0.666	0.731	1.000																																													
V 6	0.213	0.440	0.350	0.401	0.256	1.000																																												
V 7	0.664	0.606	0.662	0.621	0.711	0.341	1.000																																											
V 8	0.693	0.635	0.700	0.647	0.733	0.343	0.872	1.000																																										
V 9	0.254	0.349	0.244	0.394	0.295	0.400	0.291	0.290	1.000																																									
V 10	0.438	0.409	0.473	0.561	0.560	0.355	0.478	0.503	0.463	1.000																																							
V 11	0.136	0.193	0.208	0.355	0.172	0.489	0.191	0.154	0.511	0.300	1.000																																					
V 12	0.411	0.364	0.362	0.330	0.385	0.303	0.470	0.512	0.334	0.341	0.314	1.000																																			
V 13	0.522	0.555	0.495	0.549	0.509	0.517	0.573	0.561	0.399	0.454	0.426	0.454	1.000																																	
V 14	0.637	0.518	0.557	0.563	0.681	0.240	0.661	0.654	0.189	0.480	0.150	0.428	0.597	1.000																															
V 15	0.610	0.541	0.593	0.581	0.735	0.286	0.679	0.712	0.220	0.536	0.105	0.417	0.581	0.794	1.000																															
V 16	0.546	0.549	0.526	0.647	0.588	0.416	0.557	0.566	0.311	0.442	0.362	0.350	0.680	0.711	0.678	1.000																														
V 17	0.461	0.505	0.466	0.577	0.534	0.496	0.436	0.445	0.391	0.509	0.380	0.231	0.645	0.544	0.602	0.760	1.000																													

V 18 0.431 0.378 0.471 0.503 0.518 0.414 0.465
0.476 0.318 0.442 0.303 0.366 0.397 0.473 0.543 0.654
0.605 1.000
V 19 0.268 0.418 0.392 0.412 0.384 0.666 0.343
0.357 0.417 0.458 0.408 0.335 0.525 0.392 0.473 0.583
0.631 0.584 1.000
V 20 0.480 0.422 0.451 0.549 0.539 0.460 0.536
0.497 0.337 0.433 0.278 0.362 0.660 0.618 0.644 0.772
0.679 0.603 0.656 1.000
V 21 0.368 0.498 0.430 0.544 0.459 0.585 0.457
0.428 0.428 0.481 0.475 0.316 0.623 0.488 0.505 0.699
0.701 0.543 0.692 0.753 1.000
V 22 0.379 0.410 0.400 0.432 0.424 0.505 0.436
0.461 0.447 0.409 0.433 0.493 0.561 0.502 0.500 0.516
0.594 0.497 0.603 0.603 0.691 1.000
V 23 0.414 0.487 0.407 0.448 0.476 0.371 0.466
0.494 0.356 0.480 0.341 0.422 0.609 0.528 0.538 0.509
0.490 0.371 0.500 0.563 0.467 0.516 1.000
V 24 0.334 0.239 0.392 0.483 0.428 0.157 0.457
0.427 0.296 0.366 0.238 0.304 0.378 0.448 0.493 0.490
0.407 0.436 0.336 0.546 0.423 0.435 0.444 1.000
V 25 0.507 0.371 0.595 0.421 0.573 0.213 0.536
0.566 0.121 0.430 0.017 0.411 0.370 0.629 0.677 0.459
0.445 0.476 0.399 0.471 0.335 0.417 0.451 0.516 1.000
V 26 0.472 0.454 0.494 0.490 0.437 0.168 0.432
0.480 0.248 0.364 0.123 0.371 0.359 0.486 0.545 0.491
0.407 0.381 0.274 0.351 0.327 0.422 0.388 0.272 0.488
1.000
V 27 0.431 0.316 0.478 0.486 0.471 0.147 0.496
0.514 0.212 0.384 0.177 0.337 0.350 0.553 0.515 0.469
0.369 0.341 0.286 0.447 0.305 0.442 0.378 0.462 0.617
0.566 1.000
V 28 0.376 0.244 0.383 0.419 0.421 0.208 0.414
0.442 0.270 0.339 0.108 0.223 0.398 0.390 0.412 0.535
0.445 0.384 0.320 0.506 0.444 0.352 0.242 0.423 0.369
0.439 0.447 1.000
V 29 0.382 0.288 0.464 0.380 0.456 0.273 0.400
0.402 0.141 0.344 0.163 0.293 0.387 0.417 0.468 0.455
0.478 0.516 0.438 0.516 0.372 0.356 0.314 0.362 0.496
0.275 0.591 0.500 1.000
V 30 0.509 0.342 0.536 0.485 0.591 0.122 0.529
0.556 0.178 0.488 0.092 0.350 0.298 0.513 0.568 0.456
0.387 0.544 0.328 0.422 0.320 0.349 0.308 0.430 0.666
0.513 0.586 0.468 0.514 1.000
V 31 0.277 0.223 0.288 0.346 0.328 0.190 0.270
0.313 0.182 0.415 0.382 0.280 0.298 0.241 0.265 0.381
0.317 0.367 0.306 0.341 0.329 0.235 0.310 0.277 0.264
0.242 0.423 0.276 0.391 0.367 1.000
V 32 0.301 0.547 0.285 0.432 0.369 0.415 0.348
0.381 0.423 0.396 0.363 0.367 0.401 0.362 0.423 0.452
0.490 0.447 0.470 0.452 0.446 0.496 0.459 0.339 0.340
0.356 0.484 0.278 0.395 0.394 0.425 1.000
V 33 0.476 0.405 0.504 0.553 0.579 0.345 0.517
0.579 0.324 0.610 0.306 0.531 0.404 0.526 0.544 0.447
0.437 0.466 0.410 0.417 0.358 0.502 0.502 0.467 0.526

0.469 0.510 0.292 0.425 0.560 0.446 0.549 1.000
V 34 0.326 0.301 0.446 0.377 0.416 0.313 0.352
0.380 0.210 0.388 0.245 0.328 0.370 0.362 0.430 0.456
0.459 0.504 0.465 0.496 0.375 0.338 0.406 0.438 0.502
0.263 0.565 0.440 0.785 0.536 0.451 0.509 0.463 1.000
V 35 0.164 0.171 0.311 0.371 0.247 0.297 0.215
0.273 0.321 0.316 0.410 0.258 0.315 0.092 0.216 0.239
0.282 0.314 0.308 0.307 0.340 0.237 0.226 0.340 0.221
0.194 0.309 0.251 0.389 0.285 0.379 0.334 0.345 0.406
1.000
V 36 0.220 0.216 0.257 0.304 0.275 0.289 0.233
0.243 0.219 0.328 0.212 0.302 0.278 0.257 0.293 0.345
0.415 0.350 0.452 0.376 0.394 0.409 0.308 0.334 0.439
0.392 0.590 0.356 0.461 0.428 0.408 0.445 0.401 0.459
0.421 1.000
V 37 0.412 0.346 0.465 0.459 0.489 0.324 0.409
0.433 0.219 0.397 0.230 0.355 0.402 0.477 0.487 0.523
0.486 0.527 0.392 0.546 0.494 0.403 0.372 0.485 0.595
0.391 0.596 0.475 0.677 0.595 0.429 0.409 0.476 0.673
0.468 0.604 1.000
V 38 0.514 0.421 0.525 0.551 0.557 0.323 0.516
0.539 0.297 0.397 0.288 0.431 0.487 0.583 0.608 0.556
0.537 0.486 0.398 0.559 0.500 0.558 0.464 0.541 0.585
0.528 0.569 0.535 0.476 0.469 0.309 0.427 0.491 0.467
0.320 0.455 0.612 1.000
V 39 0.511 0.524 0.438 0.509 0.471 0.523 0.425
0.463 0.441 0.400 0.434 0.340 0.546 0.454 0.472 0.645
0.653 0.459 0.650 0.579 0.667 0.592 0.502 0.405 0.441
0.377 0.425 0.406 0.418 0.332 0.284 0.454 0.395 0.454
0.274 0.536 0.521 0.610 1.000
V 40 0.449 0.425 0.397 0.461 0.492 0.425 0.425
0.418 0.327 0.382 0.317 0.212 0.494 0.497 0.465 0.644
0.650 0.401 0.514 0.547 0.582 0.467 0.452 0.385 0.428
0.340 0.464 0.452 0.460 0.282 0.270 0.446 0.259 0.471
0.244 0.494 0.501 0.584 0.771 1.000
V 41 0.507 0.434 0.478 0.533 0.553 0.349 0.470
0.515 0.309 0.414 0.315 0.382 0.496 0.586 0.547 0.576
0.470 0.546 0.423 0.567 0.434 0.467 0.483 0.429 0.559
0.451 0.471 0.437 0.390 0.415 0.376 0.410 0.411 0.388
0.301 0.420 0.521 0.739 0.624 0.596 1.000
V 42 0.332 0.351 0.341 0.410 0.370 0.522 0.341
0.380 0.326 0.319 0.448 0.391 0.518 0.341 0.415 0.529
0.520 0.476 0.584 0.590 0.595 0.467 0.465 0.413 0.335
0.195 0.360 0.369 0.424 0.273 0.352 0.450 0.350 0.449
0.391 0.397 0.460 0.484 0.609 0.596 0.535 1.000
V 43 0.229 0.319 0.225 0.367 0.339 0.300 0.257
0.299 0.352 0.361 0.319 0.374 0.322 0.260 0.355 0.292
0.360 0.350 0.432 0.394 0.421 0.438 0.395 0.382 0.318
0.303 0.305 0.232 0.216 0.270 0.208 0.371 0.407 0.258
0.268 0.383 0.341 0.386 0.449 0.382 0.441 0.594 1.000
V 44 0.319 0.431 0.385 0.384 0.318 0.375 0.282
0.320 0.292 0.277 0.363 0.275 0.363 0.303 0.315 0.470
0.493 0.335 0.481 0.403 0.509 0.403 0.336 0.268 0.325
0.240 0.270 0.215 0.283 0.231 0.207 0.366 0.290 0.345
0.162 0.234 0.307 0.345 0.633 0.501 0.425 0.571 0.401

1.000
V 45 0.295 0.298 0.250 0.349 0.303 0.266 0.259
0.352 0.282 0.371 0.221 0.244 0.313 0.264 0.393 0.450
0.412 0.400 0.426 0.385 0.421 0.369 0.250 0.356 0.320
0.307 0.285 0.409 0.330 0.369 0.208 0.271 0.360 0.261
0.320 0.283 0.377 0.381 0.519 0.379 0.421 0.520 0.611
0.501 1.000
V 46 0.193 0.297 0.246 0.285 0.245 0.364 0.258
0.281 0.444 0.299 0.459 0.314 0.377 0.261 0.245 0.365
0.421 0.269 0.435 0.303 0.399 0.570 0.335 0.317 0.220
0.256 0.413 0.315 0.307 0.235 0.259 0.404 0.314 0.341
0.213 0.345 0.329 0.394 0.514 0.467 0.383 0.390 0.442
0.347 0.408 1.000
V 47 0.361 0.386 0.459 0.479 0.435 0.357 0.417
0.376 0.387 0.292 0.348 0.346 0.439 0.400 0.424 0.510
0.434 0.396 0.391 0.506 0.476 0.349 0.375 0.485 0.384
0.269 0.431 0.421 0.475 0.384 0.226 0.350 0.337 0.439
0.350 0.352 0.483 0.493 0.519 0.499 0.404 0.488 0.398
0.406 0.379 0.464 1.000
V 48 0.190 0.230 0.246 0.344 0.275 0.360 0.205
0.164 0.513 0.268 0.650 0.232 0.339 0.137 0.185 0.361
0.360 0.317 0.422 0.378 0.455 0.413 0.389 0.347 0.111
0.087 0.314 0.266 0.369 0.166 0.422 0.375 0.315 0.375
0.384 0.288 0.320 0.339 0.491 0.416 0.338 0.544 0.482
0.377 0.356 0.589 0.611 1.000
V 49 0.260 0.177 0.316 0.315 0.346 0.255 0.310
0.264 0.241 0.427 0.280 0.334 0.334 0.307 0.418 0.475
0.447 0.451 0.421 0.502 0.415 0.341 0.449 0.354 0.381
0.360 0.391 0.520 0.505 0.351 0.351 0.304 0.334 0.466
0.281 0.357 0.395 0.397 0.368 0.412 0.422 0.398 0.406
0.252 0.317 0.378 0.434 0.423 1.000
V 50 0.400 0.301 0.436 0.480 0.530 0.336 0.401
0.426 0.320 0.382 0.391 0.391 0.450 0.460 0.524 0.596
0.512 0.548 0.450 0.601 0.581 0.494 0.422 0.500 0.519
0.346 0.499 0.449 0.466 0.520 0.402 0.424 0.478 0.450
0.320 0.422 0.526 0.572 0.489 0.436 0.555 0.488 0.353
0.408 0.411 0.439 0.536 0.446 0.533 1.000
V 51 0.497 0.349 0.488 0.524 0.538 0.285 0.480
0.476 0.393 0.538 0.358 0.408 0.406 0.516 0.507 0.581
0.533 0.569 0.422 0.586 0.509 0.486 0.435 0.538 0.556
0.462 0.514 0.436 0.534 0.604 0.354 0.450 0.560 0.476
0.367 0.472 0.550 0.591 0.522 0.460 0.507 0.444 0.427
0.428 0.466 0.445 0.535 0.375 0.515 0.719 1.000
V 52 0.367 0.316 0.407 0.446 0.433 0.266 0.327
0.348 0.289 0.348 0.340 0.473 0.424 0.390 0.420 0.527
0.490 0.459 0.347 0.497 0.414 0.411 0.447 0.405 0.403
0.292 0.520 0.418 0.529 0.469 0.369 0.454 0.432 0.580
0.282 0.494 0.589 0.560 0.469 0.508 0.464 0.499 0.295
0.369 0.355 0.419 0.567 0.437 0.467 0.622 0.615 1.000

ADEQUACY OF THE CORRELATION MATRIX

Determinant of the matrix = 0.000000000000000

FACTOR appendix C succent.txt

Bartlett's statistic = 6770.0 (df = 1326; P = 0.000010)
Kaiser-Meyer-Olkin (KMO) test = 0.92773 (very good)

EXPLAINED VARIANCE BASED ON EIGENVALUES

Variable	Eigenvalue	Proportion of Variance	Cumulative Proportion of Variance
1	22.70418	0.43662	0.43662
2	3.56788	0.06861	0.50523
3	2.57662	0.04955	0.55478
4	1.74843	0.03362	
5	1.45217	0.02793	
6	1.29680	0.02494	
7	1.23597	0.02377	
8	1.17270	0.02255	
9	1.05469	0.02028	
10	0.93515	0.01798	
11	0.91888	0.01767	
12	0.87555	0.01684	
13	0.82541	0.01587	
14	0.72458	0.01393	
15	0.70533	0.01356	
16	0.65735	0.01264	
17	0.63246	0.01216	
18	0.58346	0.01122	
19	0.54808	0.01054	
20	0.50857	0.00978	
21	0.47923	0.00922	
22	0.44990	0.00865	
23	0.44106	0.00848	
24	0.42773	0.00823	
25	0.39540	0.00760	
26	0.38911	0.00748	
27	0.37015	0.00712	
28	0.35107	0.00675	
29	0.32604	0.00627	
30	0.30213	0.00581	
31	0.28859	0.00555	
32	0.27134	0.00522	
33	0.25725	0.00495	
34	0.25600	0.00492	
35	0.22191	0.00427	
36	0.20805	0.00400	
37	0.20044	0.00385	
38	0.18881	0.00363	
39	0.17117	0.00329	
40	0.16296	0.00313	
41	0.14190	0.00273	
42	0.13932	0.00268	
43	0.13011	0.00250	
44	0.11760	0.00226	
45	0.11229	0.00216	

46	0.09820	0.00189
47	0.09396	0.00181
48	0.08191	0.00158
49	0.06958	0.00134
50	0.06181	0.00119
51	0.04525	0.00087
52	0.02548	0.00049

MINIMUM AVERAGE PARTIAL TEST (MAP)
Velicer (1976)

Dimensions	Averaged Partial
1	0.02577
2	0.01575
3	0.01484*
4	0.01531
5	0.01851
6	0.02440
7	0.03489
8	0.05865
9	0.14425

* Advised number of dimensions: 3

UNROTATED LOADING MATRIX

Variable	C 1	C 2	C 3	Communality
V 1	-0.658	-0.411	0.216	0.649
V 2	-0.635	-0.172	0.442	0.628
V 3	-0.691	-0.341	0.122	0.608
V 4	-0.747	-0.182	0.214	0.636
V 5	-0.743	-0.384	0.141	0.719
V 6	-0.539	0.373	0.333	0.542
V 7	-0.698	-0.405	0.244	0.711
V 8	-0.723	-0.426	0.232	0.757
V 9	-0.491	0.353	0.222	0.415
V 10	-0.645	-0.086	0.077	0.429
V 11	-0.459	0.565	0.131	0.547
V 12	-0.556	-0.056	0.038	0.314
V 13	-0.714	0.038	0.345	0.630
V 14	-0.718	-0.409	0.184	0.716
V 15	-0.762	-0.381	0.133	0.743
V 16	-0.807	-0.034	0.166	0.681
V 17	-0.762	0.122	0.176	0.627
V 18	-0.704	-0.012	-0.045	0.498
V 19	-0.686	0.329	0.171	0.608
V 20	-0.786	0.047	0.088	0.627
V 21	-0.743	0.278	0.246	0.689
V 22	-0.704	0.183	0.187	0.564

V	23	-0.663	0.026	0.181	0.472
V	24	-0.624	-0.047	-0.170	0.421
V	25	-0.679	-0.391	-0.198	0.653
V	26	-0.579	-0.312	-0.011	0.432
V	27	-0.672	-0.211	-0.380	0.640
V	28	-0.593	-0.083	-0.217	0.406
V	29	-0.651	-0.054	-0.434	0.614
V	30	-0.649	-0.379	-0.319	0.666
V	31	-0.496	0.089	-0.285	0.335
V	32	-0.631	0.156	-0.031	0.424
V	33	-0.684	-0.167	-0.069	0.500
V	34	-0.656	0.024	-0.427	0.613
V	35	-0.455	0.221	-0.266	0.327
V	36	-0.570	0.142	-0.412	0.514
V	37	-0.715	-0.057	-0.395	0.671
V	38	-0.761	-0.103	-0.099	0.600
V	39	-0.763	0.258	0.152	0.671
V	40	-0.706	0.175	0.051	0.531
V	41	-0.728	-0.038	0.004	0.531
V	42	-0.680	0.377	0.029	0.606
V	43	-0.549	0.297	0.009	0.389
V	44	-0.558	0.270	0.184	0.418
V	45	-0.552	0.203	-0.036	0.347
V	46	-0.545	0.399	-0.037	0.458
V	47	-0.655	0.175	-0.110	0.472
V	48	-0.533	0.567	-0.086	0.613
V	49	-0.586	0.135	-0.273	0.436
V	50	-0.727	0.077	-0.195	0.573
V	51	-0.757	-0.013	-0.210	0.618
V	52	-0.675	0.102	-0.309	0.562

FULL TARGET LOADING MATRIX
Obtained from prerotation of the loading matrix

Variable	C 1	C 2	C 3
V 1	1.000	0.001	0.003
V 2	0.705	0.047	-0.000
V 3	0.816	0.002	0.018
V 4	0.634	0.037	0.007
V 5	0.844	0.002	0.016
V 6	0.014	0.831	-0.000
V 7	0.985	0.001	0.002
V 8	0.978	0.001	0.003
V 9	0.007	0.876	0.000
V 10	0.404	0.058	0.043
V 11	-0.000	1.000	0.001
V 12	0.335	0.065	0.066
V 13	0.324	0.221	0.000
V 14	0.928	0.001	0.007
V 15	0.820	0.002	0.018
V 16	0.349	0.118	0.019
V 17	0.164	0.291	0.013

V 18	0.183	0.078	0.160
V 19	0.026	0.641	0.007
V 20	0.205	0.170	0.046
V 21	0.064	0.548	0.003
V 22	0.106	0.408	0.008
V 23	0.288	0.188	0.008
V 24	0.116	0.026	0.411
V 25	0.375	0.000	0.271
V 26	0.654	0.000	0.078
V 27	0.085	0.000	0.763
V 28	0.104	0.010	0.542
V 29	0.019	0.003	1.000
V 30	0.211	-0.000	0.482
V 31	0.005	0.038	0.827
V 32	0.049	0.264	0.127
V 33	0.342	0.012	0.179
V 34	0.010	0.010	0.979
V 35	0.000	0.127	0.625
V 36	0.001	0.029	0.978
V 37	0.034	0.006	0.842
V 38	0.233	0.028	0.222
V 39	0.059	0.474	0.016
V 40	0.073	0.324	0.055
V 41	0.250	0.075	0.105
V 42	0.006	0.601	0.044
V 43	0.006	0.572	0.054
V 44	0.032	0.665	0.002
V 45	0.020	0.361	0.120
V 46	0.000	0.638	0.064
V 47	0.026	0.217	0.232
V 48	-0.000	0.684	0.053
V 49	0.007	0.075	0.644
V 50	0.048	0.082	0.395
V 51	0.089	0.038	0.421
V 52	0.013	0.053	0.666

ROTATED LOADING MATRIX

Variable	C 1	C 2	C 3
V 1	0.900	-0.106	-0.064
V 2	0.809	0.276	-0.371
V 3	0.770	-0.067	0.072
V 4	0.699	0.183	-0.031
V 5	0.854	-0.085	0.063
V 6	0.110	0.795	-0.257
V 7	0.933	-0.070	-0.088
V 8	0.957	-0.090	-0.065
V 9	0.024	0.695	-0.126
V 10	0.448	0.180	0.116
V 11	-0.280	0.872	-0.014
V 12	0.346	0.160	0.138
V 13	0.552	0.488	-0.215

V 14	0.901	-0.099	-0.002
V 15	0.854	-0.079	0.080
V 16	0.536	0.345	0.053
V 17	0.359	0.509	0.026
V 18	0.306	0.218	0.298
V 19	0.102	0.711	0.008
V 20	0.382	0.386	0.150
V 21	0.239	0.715	-0.073
V 22	0.275	0.563	-0.008
V 23	0.417	0.368	-0.015
V 24	0.212	0.083	0.436
V 25	0.577	-0.299	0.490
V 26	0.588	-0.146	0.209
V 27	0.248	-0.197	0.729
V 28	0.199	0.006	0.488
V 29	0.033	-0.058	0.795
V 30	0.460	-0.361	0.640
V 31	-0.076	0.126	0.545
V 32	0.107	0.388	0.256
V 33	0.441	0.024	0.322
V 34	-0.041	0.035	0.788
V 35	-0.221	0.271	0.508
V 36	-0.194	0.145	0.739
V 37	0.096	-0.017	0.766
V 38	0.388	0.107	0.388
V 39	0.198	0.649	0.059
V 40	0.183	0.480	0.173
V 41	0.382	0.223	0.241
V 42	-0.058	0.687	0.195
V 43	-0.049	0.538	0.175
V 44	0.115	0.605	-0.053
V 45	0.017	0.409	0.236
V 46	-0.193	0.627	0.236
V 47	0.038	0.376	0.369
V 48	-0.411	0.785	0.297
V 49	-0.074	0.217	0.561
V 50	0.111	0.246	0.505
V 51	0.208	0.147	0.535
V 52	-0.026	0.194	0.639

ROTATED LOADING MATRIX
(loadings lower than absolute 0.300 omitted)

Variable	C 1	C 2	C 3
V 1	0.900		
V 2	0.809		-0.371
V 3	0.770		
V 4	0.699		
V 5	0.854		
V 6		0.795	
V 7	0.933		
V 8	0.957		
V 9		0.695	
V 10	0.448		

V	11		0.872	
V	12	0.346		
V	13	0.552	0.488	
V	14	0.901		
V	15	0.854		
V	16	0.536	0.345	
V	17	0.359	0.509	
V	18	0.306		
V	19		0.711	
V	20	0.382	0.386	
V	21		0.715	
V	22		0.563	
V	23	0.417	0.368	
V	24			0.436
V	25	0.577		0.490
V	26	0.588		
V	27			0.729
V	28			0.488
V	29			0.795
V	30	0.460	-0.361	0.640
V	31			0.545
V	32		0.388	
V	33	0.441		0.322
V	34			0.788
V	35			0.508
V	36			0.739
V	37			0.766
V	38	0.388		0.388
V	39		0.649	
V	40		0.480	
V	41	0.382		
V	42		0.687	
V	43		0.538	
V	44		0.605	
V	45		0.409	
V	46		0.627	
V	47		0.376	0.369
V	48	-0.411	0.785	
V	49			0.561
V	50			0.505
V	51			0.535
V	52			0.639

EXPLAINED VARIANCE AND RELIABILITY OF ROTATED COMPONENTS
Mislevy & Bock (1990)

Component	Variance	Proportion of variance	Reliability estimate
1	11.319	0.218	0.968
2	9.209	0.177	0.950
3	8.321	0.160	0.943

INDICES OF FACTOR SIMPLICITY
Bentler (1977) & Lorenzo-Seva (2003)

Bentler's simplicity index (S) : 0.94531 (Percentile 100)
Loading simplicity index (LS) : 0.35149 (Percentile 100)

INTER-FACTORS CORRELATION MATRIX

Component	C 1	C 2	C 3
C 1	1.000		
C 2	0.578	1.000	
C 3	0.632	0.574	1.000

STRUCTURE MATRIX

Variable	C 1	C 2	C 3
V 1	0.798	0.377	0.443
V 2	0.733	0.530	0.298
V 3	0.777	0.420	0.520
V 4	0.785	0.569	0.515
V 5	0.845	0.445	0.554
V 6	0.407	0.711	0.269
V 7	0.837	0.419	0.462
V 8	0.864	0.426	0.489
V 9	0.347	0.637	0.288
V 10	0.625	0.505	0.502
V 11	0.214	0.701	0.308
V 12	0.525	0.439	0.448
V 13	0.698	0.684	0.414
V 14	0.842	0.420	0.510
V 15	0.859	0.461	0.574
V 16	0.769	0.686	0.590
V 17	0.670	0.732	0.545
V 18	0.621	0.566	0.617
V 19	0.518	0.775	0.481
V 20	0.700	0.693	0.613
V 21	0.606	0.811	0.488
V 22	0.596	0.717	0.489
V 23	0.620	0.600	0.459
V 24	0.536	0.456	0.618
V 25	0.714	0.316	0.683
V 26	0.636	0.314	0.497
V 27	0.595	0.365	0.773
V 28	0.511	0.401	0.618
V 29	0.502	0.417	0.782
V 30	0.656	0.272	0.724
V 31	0.342	0.395	0.570
V 32	0.493	0.596	0.546

V 33	0.659	0.464	0.615
V 34	0.478	0.464	0.782
V 35	0.257	0.435	0.524
V 36	0.357	0.457	0.700
V 37	0.570	0.477	0.816
V 38	0.696	0.555	0.695
V 39	0.610	0.797	0.556
V 40	0.570	0.685	0.564
V 41	0.663	0.583	0.611
V 42	0.462	0.765	0.552
V 43	0.373	0.610	0.453
V 44	0.431	0.641	0.366
V 45	0.402	0.554	0.481
V 46	0.318	0.650	0.473
V 47	0.488	0.609	0.608
V 48	0.230	0.718	0.487
V 49	0.406	0.496	0.639
V 50	0.572	0.600	0.717
V 51	0.631	0.574	0.751
V 52	0.490	0.546	0.734

CONSENSUS INTER-FACTOR CORRELATION MATRIX AMONG MULTIPLE IMPUTATED DATASETS

Factor	F 1	F 2	F 3
F 1	1.000		
F 2	0.579	1.000	
F 3	0.628	0.580	1.000

PARTICIPANTS' SCORES ON FACTORS:
Bayes Expected A Posteriori (EAP)
Muraki (1990)

Method to handle missing data: Hot-Deck Multiple Imputation in Exploratory Factor Analysis (Lorenzo-Seva & Van Ginkel, 2015)

Case	Factor 1	2	3
1	0.318	0.127	-0.278
2	-1.859	-0.988	-0.337
3	0.577	0.522	-0.241
4	-0.968	-0.832	-0.308
5	-0.063	0.503	0.562
6	-0.546	0.345	-0.187
7	0.035	0.596	-0.029
8	0.998	0.605	0.747
9	-1.708	-1.158	-1.589

10	0.507	0.101	0.305
11	-0.054	0.036	-0.129
12	-1.662	-0.736	-0.881
13	1.181	0.280	0.509
14	-0.037	-0.712	0.128
15	-0.027	-1.075	-0.498
16	2.228	1.240	0.918
17	-0.007	1.074	-1.344
18	0.047	0.326	0.368
19	-0.574	1.038	-2.212
20	-1.755	-1.444	0.647
21	-2.273	-1.547	-1.839
22	2.324	0.178	1.124
23	1.079	0.674	0.615
24	1.777	-2.660	-0.031
25	-0.490	-0.946	-0.658
26	0.678	-0.136	0.475
27	0.219	0.914	-0.949
28	-0.439	-1.474	0.192
29	0.613	0.723	0.638
30	0.621	1.064	0.441
31	0.660	0.686	0.600
32	0.653	0.642	0.522
33	0.691	1.369	1.492
34	0.762	1.196	1.172
35	1.199	1.034	1.098
36	0.041	-0.932	-0.308
37	0.837	1.735	2.015
38	-0.019	-0.596	0.122
39	0.011	0.391	0.003
40	1.160	1.359	1.015
41	-2.556	-2.446	-1.376
42	-0.002	0.598	1.067
43	0.660	-0.107	0.281
44	-1.149	0.171	-0.199
45	-0.283	-1.788	0.231
46	0.043	0.305	1.327
47	0.012	-0.035	0.757
48	-0.034	0.026	1.153
49	-1.786	-0.611	-0.921
50	1.668	-0.231	-0.259
51	1.271	-0.058	0.330
52	-0.779	-0.058	-0.181
53	1.095	0.149	2.484
54	0.765	-0.748	0.151
55	-0.123	0.128	-0.496
56	0.570	-1.274	-0.030
57	0.223	-0.648	-0.360
58	0.158	-1.746	-0.935
59	-0.270	-0.146	-0.510
60	-1.091	-0.895	-0.083
61	2.292	-2.740	3.545
62	-0.012	-0.942	0.002
63	-0.118	0.465	0.042
64	0.556	0.813	0.653

65	0.538	1.077	0.059
66	-0.629	0.125	-0.423
67	-1.060	-0.518	-0.460
68	2.404	3.142	2.842
69	1.512	2.231	1.943
70	-1.370	-1.122	1.187
71	-0.088	0.749	-1.302
72	-1.067	-1.183	-1.239
73	-1.065	-0.955	-0.895
74	-0.585	0.017	-1.047
75	-0.619	-1.225	-1.322
76	0.724	-1.001	0.945
77	-0.322	-1.240	-1.127
78	2.123	0.911	1.602
79	0.580	-0.700	-0.162
80	0.726	1.845	1.030
81	0.082	1.458	0.753
82	-0.513	0.297	-0.475
83	-0.571	-0.012	-0.391
84	-0.129	0.688	0.383
85	-1.256	-0.898	-1.794
86	-0.626	0.804	0.662
87	0.506	0.564	-0.396
88	0.518	1.347	1.332
89	-0.913	-0.176	-0.582
90	1.177	-0.179	2.446
91	-1.865	-1.574	-1.194
92	-1.806	-1.890	-1.786
93	0.251	0.595	1.354
94	0.483	0.387	0.277
95	-1.680	-2.277	-1.686
96	-1.752	-1.030	-1.627
97	0.523	0.577	0.191
98	0.703	0.510	0.239
99	-1.568	-1.763	-2.922
100	-0.562	-0.383	-0.605
101	-0.218	0.012	-0.345
102	-0.045	0.158	-0.104
103	0.316	1.272	0.641
104	0.193	0.672	0.292
105	-2.050	-1.661	-2.009
106	-0.709	-0.413	-0.582
107	-0.609	-0.382	-0.631
108	0.018	0.488	0.290
109	-0.605	-0.609	-0.414
110	0.006	-0.667	-0.623
111	0.612	0.639	0.566
112	0.591	0.017	0.759
113	0.622	0.494	1.089
114	0.609	0.025	-0.489
115	-0.052	-0.525	0.887
116	-1.148	-0.564	-1.090
117	-0.587	-0.444	0.488
118	0.684	1.003	0.756
119	-1.049	-0.145	0.006

120	0.006	-0.743	-0.409
121	1.157	1.205	-0.467
122	1.145	1.399	0.396
123	-0.351	-0.063	0.452
124	0.575	0.559	-0.172
125	-0.566	-0.638	-1.184
126	0.497	0.468	1.516
127	-0.009	0.315	-0.692
128	-0.605	-2.214	-1.656
129	-0.005	0.033	-0.176
130	2.674	2.456	-0.218
131	1.212	0.708	0.638
132	0.531	0.519	-0.094
133	-0.205	0.444	1.030
134	0.282	0.958	1.145
135	0.007	1.129	0.528
136	-0.474	0.218	-1.131
137	0.257	0.009	0.313
138	1.166	1.149	0.173
139	0.034	1.714	1.308
140	-1.442	0.005	0.073
141	-1.706	-2.055	-0.792
142	-0.926	-0.512	-0.472
143	0.058	0.144	0.456
144	-1.168	-1.178	-0.630
145	-1.807	-1.762	-1.158
146	-1.673	-0.648	-1.087
147	-1.542	-2.087	-2.086
148	0.002	0.732	0.050
149	-1.162	-2.224	-2.120
150	0.855	0.947	0.007
151	0.591	-1.285	-0.510
152	1.882	0.315	0.014
153	1.797	-0.506	0.715
154	0.586	0.026	0.102
155	1.979	0.160	-0.573
156	-0.576	0.029	-0.633
157	-0.451	0.047	0.978
158	0.732	0.390	0.086
159	-0.565	0.634	0.567
160	-0.017	0.602	0.546
161	1.179	-0.047	-0.416
162	0.575	0.055	0.138
163	1.122	-0.048	0.891
164	0.748	0.647	1.165
165	-1.505	-0.476	-0.533
166	-0.033	-0.801	-0.463
167	1.233	-0.246	0.145
168	0.048	-0.692	-1.049
169	-0.555	-0.764	-1.656
170	-1.014	-0.416	-1.913
171	0.523	1.109	1.076

PRECISION OF FACTOR SCORES

FACTOR: 1

Case	Approximate 95% confidence interval	Posterior SE	Reliability
1	(-0.239 0.875)	0.284	0.919
2	(-2.367 -1.351)	0.259	0.933
3	(0.378 0.776)	0.102	0.990
4	(-1.485 -0.451)	0.264	0.930
5	(-0.415 0.290)	0.180	0.968
6	(-0.780 -0.311)	0.120	0.986
7	(-0.238 0.309)	0.139	0.981
8	(0.510 1.486)	0.249	0.938
9	(-1.971 -1.446)	0.134	0.982
10	(0.141 0.873)	0.187	0.965
11	(-0.391 0.283)	0.172	0.970
12	(-2.015 -1.310)	0.180	0.968
13	(0.885 1.478)	0.151	0.977
14	(-0.332 0.258)	0.150	0.977
15	(-0.284 0.229)	0.131	0.983
16	(1.582 2.874)	0.329	0.892
17	(-0.194 0.180)	0.095	0.991
18	(-0.275 0.370)	0.165	0.973
19	(-0.790 -0.358)	0.110	0.988
20	(-2.157 -1.353)	0.205	0.958
21	(-2.831 -1.715)	0.285	0.919
22	(1.694 2.953)	0.321	0.897
23	(0.720 1.438)	0.183	0.966
24	(1.202 2.352)	0.293	0.914
25	(-0.882 -0.098)	0.200	0.960
26	(0.241 1.116)	0.223	0.950
27	(-0.326 0.764)	0.278	0.923
28	(-0.916 0.038)	0.243	0.941
29	(0.319 0.908)	0.151	0.977
30	(0.304 0.937)	0.162	0.974
31	(0.254 1.065)	0.207	0.957
32	(0.261 1.044)	0.200	0.960
33	(0.235 1.147)	0.233	0.946
34	(0.234 1.290)	0.269	0.927
35	(0.859 1.540)	0.174	0.970
36	(-0.257 0.340)	0.152	0.977
37	(0.278 1.395)	0.285	0.919
38	(-0.240 0.203)	0.113	0.987
39	(-0.157 0.179)	0.086	0.993
40	(0.933 1.387)	0.116	0.987
41	(-3.255 -1.858)	0.356	0.873
42	(-0.192 0.189)	0.097	0.991
43	(0.251 1.069)	0.209	0.956
44	(-1.307 -0.992)	0.080	0.994
45	(-0.847 0.280)	0.287	0.917
46	(-0.256 0.341)	0.152	0.977
47	(-0.176 0.200)	0.096	0.991
48	(-0.303 0.235)	0.137	0.981
49	(-2.175 -1.398)	0.198	0.961

50	(1.241	2.095)	0.218	0.952
51	(0.801	1.741)	0.240	0.942
52	(-1.318	-0.240)	0.275	0.924
53	(0.757	1.433)	0.173	0.970
54	(0.229	1.302)	0.274	0.925
55	(-0.584	0.338)	0.235	0.945
56	(0.271	0.868)	0.152	0.977
57	(-0.325	0.771)	0.280	0.922
58	(-0.349	0.664)	0.258	0.933
59	(-0.829	0.290)	0.285	0.919
60	(-1.418	-0.765)	0.167	0.972
61	(1.530	3.054)	0.389	0.849
62	(-0.259	0.235)	0.126	0.984
63	(-0.572	0.336)	0.232	0.946
64	(0.347	0.765)	0.107	0.989
65	(0.253	0.823)	0.145	0.979
66	(-0.968	-0.291)	0.173	0.970
67	(-1.449	-0.672)	0.200	0.960
68	(1.697	3.112)	0.361	0.870
69	(0.970	2.054)	0.277	0.924
70	(-1.921	-0.820)	0.281	0.921
71	(-0.495	0.320)	0.208	0.957
72	(-1.449	-0.685)	0.195	0.962
73	(-1.451	-0.678)	0.197	0.961
74	(-0.781	-0.389)	0.100	0.990
75	(-0.930	-0.308)	0.159	0.975
76	(0.227	1.221)	0.254	0.936
77	(-0.878	0.234)	0.283	0.920
78	(1.538	2.708)	0.299	0.911
79	(0.239	0.920)	0.174	0.970
80	(0.226	1.226)	0.255	0.935
81	(-0.312	0.476)	0.201	0.960
82	(-0.853	-0.172)	0.174	0.970
83	(-0.679	-0.463)	0.055	0.997
84	(-0.604	0.345)	0.242	0.941
85	(-1.706	-0.806)	0.230	0.947
86	(-0.978	-0.275)	0.179	0.968
87	(0.157	0.854)	0.181	0.967
88	(0.187	0.849)	0.169	0.971
89	(-1.462	-0.364)	0.280	0.921
90	(0.800	1.554)	0.192	0.963
91	(-2.371	-1.359)	0.258	0.933
92	(-2.238	-1.375)	0.220	0.952
93	(-0.305	0.807)	0.284	0.920
94	(0.051	0.915)	0.220	0.951
95	(-1.998	-1.362)	0.162	0.974
96	(-2.078	-1.426)	0.166	0.972
97	(0.208	0.838)	0.161	0.974
98	(0.230	1.177)	0.241	0.942
99	(-2.062	-1.074)	0.252	0.937
100	(-0.713	-0.411)	0.077	0.994
101	(-0.762	0.326)	0.277	0.923
102	(-0.349	0.259)	0.155	0.976
103	(-0.241	0.873)	0.284	0.919
104	(-0.337	0.724)	0.271	0.927

105	(-2.643 -1.457)	0.303	0.908
106	(-1.188 -0.230)	0.244	0.940
107	(-0.887 -0.331)	0.142	0.980
108	(-0.192 0.228)	0.107	0.989
109	(-0.868 -0.341)	0.135	0.982
110	(-0.184 0.197)	0.097	0.991
111	(0.321 0.903)	0.149	0.978
112	(0.375 0.806)	0.110	0.988
113	(0.288 0.955)	0.170	0.971
114	(0.310 0.907)	0.152	0.977
115	(-0.400 0.295)	0.177	0.969
116	(-1.282 -1.014)	0.068	0.995
117	(-0.793 -0.381)	0.105	0.989
118	(0.239 1.129)	0.228	0.948
119	(-1.433 -0.664)	0.203	0.959
120	(-0.170 0.183)	0.090	0.992
121	(0.920 1.393)	0.121	0.985
122	(0.842 1.449)	0.155	0.976
123	(-0.896 0.195)	0.278	0.922
124	(0.420 0.730)	0.079	0.994
125	(-0.756 -0.375)	0.097	0.991
126	(0.115 0.879)	0.195	0.962
127	(-0.170 0.152)	0.082	0.993
128	(-0.875 -0.334)	0.138	0.981
129	(-0.161 0.150)	0.079	0.994
130	(1.929 3.418)	0.380	0.856
131	(0.841 1.584)	0.190	0.964
132	(0.240 0.822)	0.148	0.978
133	(-0.742 0.332)	0.274	0.925
134	(-0.278 0.842)	0.286	0.918
135	(-0.146 0.160)	0.078	0.994
136	(-0.897 -0.051)	0.216	0.953
137	(-0.300 0.814)	0.284	0.919
138	(0.901 1.431)	0.135	0.982
139	(-0.259 0.327)	0.151	0.977
140	(-1.990 -0.893)	0.280	0.922
141	(-1.995 -1.418)	0.147	0.978
142	(-1.468 -0.384)	0.277	0.923
143	(-0.283 0.399)	0.174	0.970
144	(-1.423 -0.912)	0.130	0.983
145	(-2.242 -1.373)	0.222	0.951
146	(-2.000 -1.347)	0.167	0.972
147	(-2.059 -1.026)	0.264	0.930
148	(-0.171 0.175)	0.088	0.992
149	(-1.390 -0.934)	0.116	0.986
150	(0.294 1.415)	0.286	0.918
151	(0.290 0.891)	0.153	0.976
152	(1.344 2.421)	0.275	0.925
153	(1.330 2.264)	0.238	0.943
154	(0.396 0.776)	0.097	0.991
155	(1.377 2.580)	0.307	0.906
156	(-0.722 -0.430)	0.074	0.994
157	(-0.910 0.007)	0.234	0.945
158	(0.226 1.238)	0.258	0.933
159	(-0.703 -0.428)	0.070	0.995

160	(-0.213 | 0.179)	0.100	0.990
161	(0.816 | 1.542)	0.185	0.966
162	(0.379 | 0.771)	0.100	0.990
163	(0.831 | 1.414)	0.149	0.978
164	(0.229 | 1.266)	0.265	0.930
165	(-2.047 | -0.962)	0.277	0.923
166	(-0.320 | 0.254)	0.147	0.979
167	(0.814 | 1.651)	0.213	0.954
168	(-0.267 | 0.363)	0.161	0.974
169	(-0.821 | -0.289)	0.136	0.982
170	(-1.487 | -0.542)	0.241	0.942
171	(0.203 | 0.843)	0.163	0.973

PRECISION OF FACTOR SCORES

FACTOR: 2

Case	Approximate 95% confidence interval		Posterior SE	Reliability
1	(-0.358	0.612)	0.247	0.939
2	(-1.548	-0.429)	0.285	0.919
3	(0.110	0.934)	0.210	0.956
4	(-1.414	-0.250)	0.297	0.912
5	(0.098	0.907)	0.206	0.957
6	(-0.208	0.897)	0.282	0.920
7	(0.259	0.933)	0.172	0.970
8	(0.178	1.031)	0.218	0.953
9	(-1.702	-0.614)	0.278	0.923
10	(-0.396	0.599)	0.254	0.936
11	(-0.371	0.443)	0.208	0.957
12	(-1.268	-0.204)	0.271	0.926
13	(-0.304	0.864)	0.298	0.911
14	(-1.265	-0.160)	0.282	0.921
15	(-1.569	-0.580)	0.252	0.936
16	(0.624	1.855)	0.314	0.901
17	(0.623	1.524)	0.230	0.947
18	(-0.238	0.889)	0.288	0.917
19	(0.552	1.524)	0.248	0.939
20	(-2.089	-0.799)	0.329	0.892
21	(-2.248	-0.846)	0.357	0.872
22	(-0.404	0.761)	0.297	0.912
23	(0.101	1.247)	0.292	0.915
24	(-3.446	-1.874)	0.401	0.839
25	(-1.521	-0.372)	0.293	0.914
26	(-0.647	0.375)	0.261	0.932
27	(0.341	1.488)	0.293	0.914
28	(-2.100	-0.847)	0.320	0.898
29	(0.214	1.232)	0.260	0.932
30	(0.633	1.495)	0.220	0.952
31	(0.202	1.170)	0.247	0.939
32	(0.197	1.088)	0.227	0.948
33	(0.803	1.935)	0.289	0.917
34	(0.748	1.644)	0.228	0.948

35	(0.522 1.547)	0.262	0.931
36	(-1.505 -0.360)	0.292	0.915
37	(1.278 2.192)	0.233	0.946
38	(-0.951 -0.241)	0.181	0.967
39	(-0.135 0.917)	0.268	0.928
40	(0.803 1.915)	0.284	0.920
41	(-3.395 -1.497)	0.484	0.766
42	(0.193 1.003)	0.207	0.957
43	(-0.578 0.363)	0.240	0.942
44	(-0.355 0.698)	0.269	0.928
45	(-2.408 -1.169)	0.316	0.900
46	(-0.270 0.880)	0.293	0.914
47	(-0.409 0.340)	0.191	0.964
48	(-0.362 0.414)	0.198	0.961
49	(-1.072 -0.150)	0.235	0.945
50	(-0.800 0.338)	0.290	0.916
51	(-0.465 0.350)	0.208	0.957
52	(-0.429 0.313)	0.189	0.964
53	(-0.431 0.729)	0.296	0.913
54	(-1.323 -0.172)	0.294	0.914
55	(-0.352 0.607)	0.245	0.940
56	(-1.895 -0.654)	0.317	0.900
57	(-1.109 -0.186)	0.235	0.945
58	(-2.366 -1.126)	0.316	0.900
59	(-0.650 0.357)	0.257	0.934
60	(-1.480 -0.311)	0.298	0.911
61	(-3.534 -1.947)	0.405	0.836
62	(-1.502 -0.383)	0.285	0.919
63	(0.008 0.922)	0.233	0.946
64	(0.255 1.370)	0.284	0.919
65	(0.651 1.504)	0.219	0.952
66	(-0.351 0.601)	0.243	0.941
67	(-0.916 -0.120)	0.203	0.959
68	(2.377 3.907)	0.390	0.848
69	(1.745 2.716)	0.248	0.939
70	(-1.643 -0.601)	0.266	0.929
71	(0.191 1.307)	0.285	0.919
72	(-1.671 -0.695)	0.249	0.938
73	(-1.512 -0.399)	0.284	0.919
74	(-0.365 0.399)	0.195	0.962
75	(-1.718 -0.732)	0.252	0.937
76	(-1.527 -0.475)	0.268	0.928
77	(-1.760 -0.720)	0.265	0.930
78	(0.436 1.385)	0.244	0.941
79	(-1.253 -0.147)	0.282	0.920
80	(1.346 2.345)	0.255	0.935
81	(0.896 2.019)	0.287	0.918
82	(-0.268 0.861)	0.288	0.917
83	(-0.309 0.285)	0.151	0.977
84	(0.166 1.211)	0.267	0.929
85	(-1.479 -0.317)	0.297	0.912
86	(0.218 1.391)	0.299	0.910
87	(0.191 0.937)	0.191	0.963
88	(0.792 1.901)	0.283	0.920
89	(-0.701 0.348)	0.268	0.928

90	(-0.762 | 0.403)	0.297	0.912
91	(-2.234 | -0.913)	0.337	0.886
92	(-2.622 | -1.157)	0.373	0.861
93	(0.160 | 1.029)	0.222	0.951
94	(-0.159 | 0.934)	0.279	0.922
95	(-3.109 | -1.445)	0.424	0.820
96	(-1.572 | -0.489)	0.276	0.924
97	(0.189 | 0.964)	0.198	0.961
98	(0.102 | 0.918)	0.208	0.957
99	(-2.477 | -1.049)	0.364	0.867
100	(-0.919 | 0.152)	0.273	0.925
101	(-0.320 | 0.345)	0.170	0.971
102	(-0.353 | 0.670)	0.261	0.932
103	(0.789 | 1.754)	0.246	0.939
104	(0.226 | 1.119)	0.228	0.948
105	(-2.392 | -0.930)	0.373	0.861
106	(-0.926 | 0.099)	0.261	0.932
107	(-0.918 | 0.155)	0.274	0.925
108	(0.060 | 0.917)	0.219	0.952
109	(-0.962 | -0.256)	0.180	0.968
110	(-1.143 | -0.192)	0.243	0.941
111	(0.233 | 1.046)	0.207	0.957
112	(-0.433 | 0.468)	0.230	0.947
113	(0.018 | 0.970)	0.243	0.941
114	(-0.396 | 0.447)	0.215	0.954
115	(-1.059 | 0.008)	0.272	0.926
116	(-0.905 | -0.224)	0.174	0.970
117	(-0.989 | 0.101)	0.278	0.923
118	(0.487 | 1.520)	0.263	0.931
119	(-0.684 | 0.393)	0.275	0.924
120	(-1.280 | -0.206)	0.274	0.925
121	(0.784 | 1.626)	0.215	0.954
122	(0.818 | 1.979)	0.296	0.912
123	(-0.544 | 0.418)	0.246	0.940
124	(0.159 | 0.958)	0.204	0.958
125	(-1.150 | -0.126)	0.261	0.932
126	(-0.072 | 1.008)	0.276	0.924
127	(-0.254 | 0.885)	0.291	0.916
128	(-2.967 | -1.461)	0.384	0.852
129	(-0.296 | 0.362)	0.168	0.972
130	(1.832 | 3.080)	0.318	0.899
131	(0.201 | 1.215)	0.259	0.933
132	(0.147 | 0.891)	0.190	0.964
133	(-0.031 | 0.919)	0.242	0.941
134	(0.425 | 1.492)	0.272	0.926
135	(0.801 | 1.457)	0.168	0.972
136	(-0.334 | 0.770)	0.282	0.921
137	(-0.372 | 0.390)	0.194	0.962
138	(0.680 | 1.619)	0.240	0.943
139	(1.234 | 2.193)	0.244	0.940
140	(-0.406 | 0.415)	0.210	0.956
141	(-2.817 | -1.294)	0.388	0.849
142	(-0.931 | -0.093)	0.214	0.954
143	(-0.359 | 0.647)	0.257	0.934
144	(-1.638 | -0.717)	0.235	0.945

145	(-2.444 | -1.080)	0.348	0.879
146	(-1.116 | -0.179)	0.239	0.943
147	(-2.879 | -1.296)	0.404	0.837
148	(0.218 | 1.245)	0.262	0.931
149	(-3.015 | -1.432)	0.404	0.837
150	(0.389 | 1.505)	0.285	0.919
151	(-1.843 | -0.727)	0.285	0.919
152	(-0.267 | 0.897)	0.297	0.912
153	(-0.966 | -0.046)	0.235	0.945
154	(-0.333 | 0.385)	0.183	0.966
155	(-0.391 | 0.712)	0.281	0.921
156	(-0.332 | 0.390)	0.184	0.966
157	(-0.341 | 0.436)	0.198	0.961
158	(-0.144 | 0.924)	0.272	0.926
159	(0.245 | 1.024)	0.199	0.960
160	(0.269 | 0.935)	0.170	0.971
161	(-0.612 | 0.518)	0.288	0.917
162	(-0.336 | 0.446)	0.200	0.960
163	(-0.547 | 0.452)	0.255	0.935
164	(0.157 | 1.136)	0.250	0.938
165	(-0.945 | -0.007)	0.239	0.943
166	(-1.391 | -0.212)	0.301	0.910
167	(-0.842 | 0.351)	0.304	0.907
168	(-1.194 | -0.191)	0.256	0.935
169	(-1.360 | -0.168)	0.304	0.908
170	(-0.935 | 0.104)	0.265	0.930
171	(0.710 | 1.508)	0.204	0.959

PRECISION OF FACTOR SCORES

FACTOR: 3

Case	Approximate 95% confidence interval		Posterior SE	Reliability
1	(-0.851	0.296)	0.293	0.914
2	(-0.924	0.251)	0.300	0.910
3	(-0.808	0.327)	0.289	0.916
4	(-0.893	0.278)	0.299	0.911
5	(0.180	0.944)	0.195	0.962
6	(-0.723	0.349)	0.273	0.925
7	(-0.413	0.354)	0.196	0.962
8	(0.205	1.288)	0.276	0.924
9	(-2.209	-0.970)	0.316	0.900
10	(-0.277	0.887)	0.297	0.912
11	(-0.684	0.425)	0.283	0.920
12	(-1.475	-0.286)	0.303	0.908
13	(0.007	1.011)	0.256	0.934
14	(-0.432	0.687)	0.286	0.918
15	(-1.081	0.084)	0.297	0.912
16	(0.273	1.563)	0.329	0.892
17	(-1.912	-0.776)	0.290	0.916
18	(-0.212	0.948)	0.296	0.912
19	(-2.893	-1.531)	0.347	0.879

20	(0.113 | 1.181)	0.272	0.926
21	(-2.541 | -1.137)	0.358	0.872
22	(0.550 | 1.698)	0.293	0.914
23	(-0.066 | 1.296)	0.347	0.879
24	(-0.589 | 0.527)	0.285	0.919
25	(-1.137 | -0.178)	0.245	0.940
26	(-0.001 | 0.951)	0.243	0.941
27	(-1.544 | -0.354)	0.304	0.908
28	(-0.388 | 0.772)	0.296	0.912
29	(0.176 | 1.101)	0.236	0.944
30	(-0.082 | 0.964)	0.267	0.929
31	(0.160 | 1.040)	0.225	0.950
32	(0.074 | 0.971)	0.229	0.948
33	(0.905 | 2.079)	0.299	0.910
34	(0.680 | 1.663)	0.251	0.937
35	(0.574 | 1.623)	0.267	0.928
36	(-0.884 | 0.269)	0.294	0.913
37	(1.412 | 2.619)	0.308	0.905
38	(-0.365 | 0.608)	0.248	0.938
39	(-0.347 | 0.353)	0.179	0.968
40	(0.506 | 1.525)	0.260	0.932
41	(-2.062 | -0.690)	0.350	0.878
42	(0.577 | 1.556)	0.250	0.938
43	(-0.288 | 0.849)	0.290	0.916
44	(-0.755 | 0.357)	0.284	0.920
45	(-0.359 | 0.822)	0.301	0.909
46	(0.790 | 1.865)	0.274	0.925
47	(0.210 | 1.304)	0.279	0.922
48	(0.673 | 1.632)	0.244	0.940
49	(-1.491 | -0.352)	0.291	0.916
50	(-0.838 | 0.320)	0.295	0.913
51	(-0.242 | 0.901)	0.291	0.915
52	(-0.716 | 0.353)	0.273	0.926
53	(1.818 | 3.149)	0.340	0.885
54	(-0.397 | 0.699)	0.279	0.922
55	(-0.930 | -0.063)	0.221	0.951
56	(-0.524 | 0.464)	0.252	0.936
57	(-0.967 | 0.247)	0.310	0.904
58	(-1.536 | -0.335)	0.306	0.906
59	(-0.984 | -0.037)	0.242	0.942
60	(-0.581 | 0.414)	0.254	0.936
61	(2.791 | 4.300)	0.385	0.852
62	(-0.410 | 0.414)	0.210	0.956
63	(-0.398 | 0.482)	0.225	0.950
64	(0.221 | 1.085)	0.220	0.951
65	(-0.419 | 0.537)	0.244	0.940
66	(-0.931 | 0.086)	0.259	0.933
67	(-0.932 | 0.011)	0.241	0.942
68	(2.001 | 3.682)	0.429	0.816
69	(1.345 | 2.540)	0.305	0.907
70	(0.711 | 1.663)	0.243	0.941
71	(-1.849 | -0.755)	0.279	0.922
72	(-1.776 | -0.702)	0.274	0.925
73	(-1.485 | -0.306)	0.301	0.910
74	(-1.550 | -0.544)	0.257	0.934

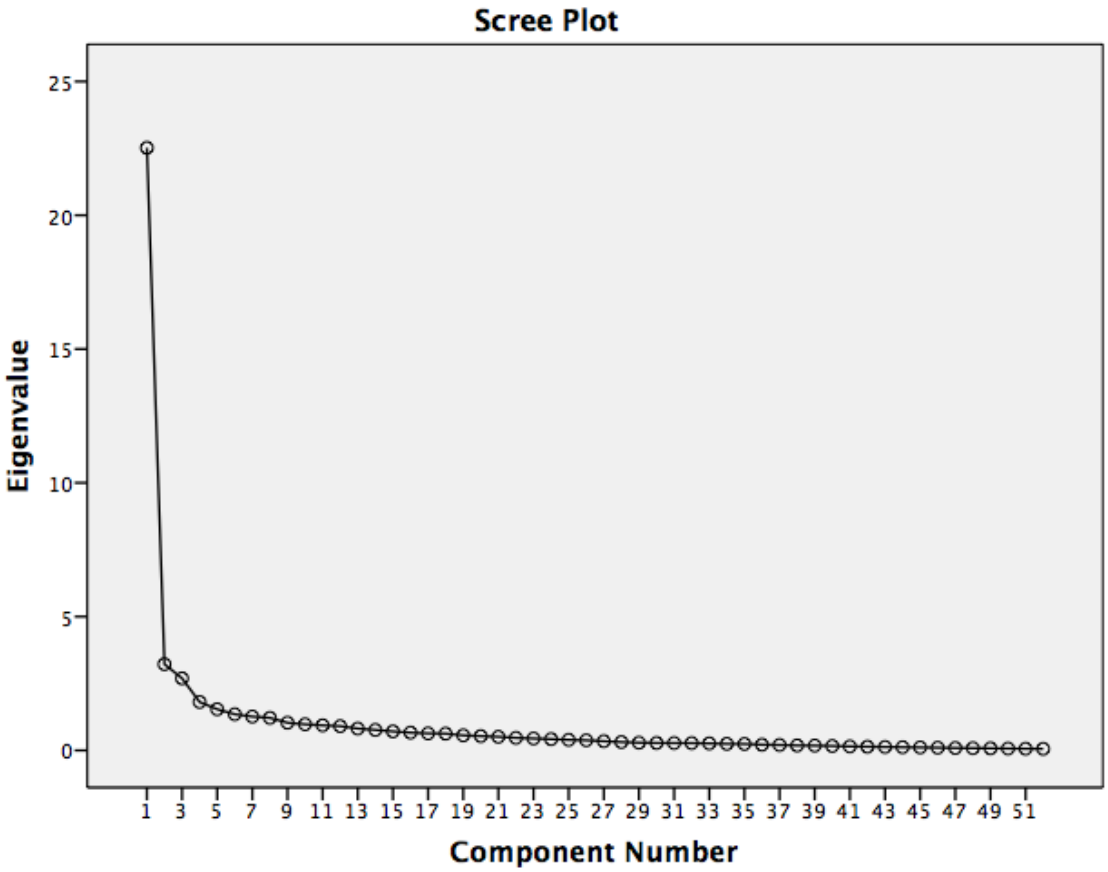
75	(-1.883 -0.762)	0.286	0.918
76	(0.387 1.503)	0.285	0.919
77	(-1.603 -0.651)	0.243	0.941
78	(1.032 2.172)	0.292	0.915
79	(-0.697 0.373)	0.273	0.925
80	(0.539 1.520)	0.250	0.937
81	(0.218 1.287)	0.273	0.926
82	(-0.936 -0.014)	0.235	0.945
83	(-0.924 0.142)	0.272	0.926
84	(-0.181 0.947)	0.288	0.917
85	(-2.395 -1.192)	0.307	0.906
86	(0.175 1.150)	0.249	0.938
87	(-0.931 0.138)	0.273	0.926
88	(0.760 1.904)	0.292	0.915
89	(-1.014 -0.149)	0.221	0.951
90	(1.762 3.130)	0.349	0.878
91	(-1.721 -0.667)	0.269	0.928
92	(-2.447 -1.125)	0.337	0.886
93	(0.797 1.912)	0.284	0.919
94	(-0.319 0.872)	0.304	0.908
95	(-2.318 -1.054)	0.322	0.896
96	(-2.247 -1.007)	0.316	0.900
97	(-0.364 0.745)	0.283	0.920
98	(-0.329 0.808)	0.290	0.916
99	(-3.848 -1.995)	0.473	0.777
100	(-0.982 -0.227)	0.193	0.963
101	(-0.904 0.215)	0.286	0.918
102	(-0.575 0.367)	0.240	0.942
103	(0.195 1.087)	0.227	0.948
104	(-0.277 0.861)	0.290	0.916
105	(-2.764 -1.254)	0.385	0.852
106	(-0.992 -0.172)	0.209	0.956
107	(-1.065 -0.197)	0.222	0.951
108	(-0.283 0.862)	0.292	0.915
109	(-0.930 0.101)	0.263	0.931
110	(-1.048 -0.199)	0.217	0.953
111	(0.117 1.016)	0.229	0.947
112	(0.213 1.305)	0.278	0.922
113	(0.638 1.539)	0.230	0.947
114	(-0.980 0.002)	0.250	0.937
115	(0.281 1.492)	0.309	0.905
116	(-1.555 -0.624)	0.238	0.944
117	(-0.001 0.976)	0.249	0.938
118	(0.143 1.369)	0.313	0.902
119	(-0.554 0.566)	0.286	0.918
120	(-0.936 0.117)	0.269	0.928
121	(-0.966 0.032)	0.254	0.935
122	(-0.162 0.954)	0.285	0.919
123	(-0.103 1.006)	0.283	0.920
124	(-0.722 0.377)	0.280	0.921
125	(-1.758 -0.610)	0.293	0.914
126	(0.949 2.083)	0.289	0.916
127	(-1.198 -0.186)	0.258	0.933
128	(-2.285 -1.028)	0.321	0.897
129	(-0.710 0.358)	0.273	0.926

130	(-0.804 0.369)	0.299	0.911
131	(0.172 1.104)	0.238	0.943
132	(-0.561 0.373)	0.239	0.943
133	(0.556 1.504)	0.242	0.942
134	(0.776 1.513)	0.188	0.965
135	(0.140 0.916)	0.198	0.961
136	(-1.566 -0.696)	0.222	0.951
137	(-0.255 0.880)	0.290	0.916
138	(-0.361 0.706)	0.272	0.926
139	(0.703 1.913)	0.309	0.905
140	(-0.457 0.604)	0.271	0.927
141	(-1.364 -0.221)	0.292	0.915
142	(-0.966 0.021)	0.252	0.937
143	(-0.035 0.948)	0.251	0.937
144	(-1.064 -0.197)	0.221	0.951
145	(-1.654 -0.662)	0.253	0.936
146	(-1.562 -0.612)	0.242	0.941
147	(-2.830 -1.341)	0.380	0.855
148	(-0.382 0.482)	0.221	0.951
149	(-2.835 -1.405)	0.365	0.867
150	(-0.474 0.488)	0.245	0.940
151	(-1.072 0.051)	0.287	0.918
152	(-0.415 0.444)	0.219	0.952
153	(0.179 1.251)	0.274	0.925
154	(-0.433 0.638)	0.273	0.925
155	(-1.211 0.066)	0.326	0.894
156	(-1.078 -0.189)	0.227	0.949
157	(0.437 1.518)	0.276	0.924
158	(-0.387 0.559)	0.242	0.942
159	(0.236 0.897)	0.169	0.972
160	(0.099 0.992)	0.228	0.948
161	(-1.008 0.176)	0.302	0.909
162	(-0.372 0.648)	0.260	0.932
163	(0.283 1.498)	0.310	0.904
164	(0.669 1.661)	0.253	0.936
165	(-1.011 -0.055)	0.244	0.941
166	(-0.976 0.049)	0.261	0.932
167	(-0.390 0.679)	0.273	0.926
168	(-1.588 -0.509)	0.275	0.924
169	(-2.325 -0.986)	0.341	0.883
170	(-2.552 -1.274)	0.326	0.894
171	(0.558 1.593)	0.264	0.930

FACTOR completed

Computing time : 0.26666667 minutes.
Matrices generated : 4753362

Appendix C Screen Plot of EFA of MDAS on clinical sample (study 1)



Appendix D List of scale symptoms on self-report depression assessment instruments in chapter 3

Scale	Items
Beck Depression Inventory (BDI)	Sadness Guilty Feelings Irritability Agitation Crying Punishment Feelings Past Failure Pessimism Self-Criticalness Loss of Interest Indecisiveness Worthlessness Loss of Pleasure Self-Dislike Suicidal Thoughts or Wishes Concentration difficulty Tiredness or Fatigue Loss of energy Changes in sleeping Pattern Changes in Appetite Loss of interest in sex
Edinburgh Postnatal Depression Scale (EPDS)	I have been anxious or worried for no good reason. I have felt scared or panicky for no very good reason. I have felt sad or miserable. I have been so unhappy that I have been crying. I have been so unhappy that I have had difficulty sleeping I have been able to laugh and see the funny side of things I have looked forward with enjoyment to things I have blamed myself unnecessarily when things went wrong Things have been getting on top of me.

	The thought of harming myself has occurred to me.
Patient Health Questionnaire 9 **(PHQ-9)**	Feeling down, depressed, or hopeless Little interest or pleasure in doing things Trouble concentrating on things, such as reading the newspaper or watching television. Thoughts that you would be better off dead or of hurting yourself in some way. Feeling bad about yourself – or that you are a failure or have let yourself or your family down. Trouble falling/staying asleep, sleeping too much. Feeling tired or having little energy Poor appetite or overeating. Moving or speaking so slowly that other people could have noticed. Or the opposite – being so fidgety or restless that you have been moving around a lot more than usual.
Hospital Anxiety and Depression Scale-Depression Subscale **(HADS-D)**	I feel cheerful. I can laugh and see the funny side of things. I have lost interest in my appearance. I look forward with enjoyment to things. I still enjoy things I used to enjoy. I can enjoy a good book or TV programme. I feel as if I am slowed down.
Centre for Epidemiological Studies Depression Scale **(CES-D)**	I felt that I could not shake off the blues even with the help of my family or friends I felt depressed I felt fearful I was happy I felt sad I had trouble keeping my mind on what I was doing I felt hopeful about the future. I thought my life had been a failure I was bothered by things that don't usually bother me. I felt lonely I enjoyed life I felt that I was just as good as other people I did not feel like eating; my appetite was poor

	My sleep was restless I talked less than usual I had crying spells I could not get “going” I felt everything I did was an effort People were unfriendly. I felt that people disliked me
Zung Self-Rating Depression Scale (SDS)	I feel down-hearted and blue Morning is when I feel the best I have crying spells or feel like it I am more irritable than usual I am restless and can’t keep still I feel hopeful about the future I find it easy to make decisions I feel that I am useful and needed My life is pretty full My mind is clear as it used to be I feel that others would be better off if I were dead I have trouble sleeping at night I eat as much as I used to I still enjoy sex I notice that I am losing weight I have trouble with constipation My heart beats faster than usual I get tired for no reason I find it easy to do the things I used to I still enjoy the things I used to do
The Postpartum Depression Screening Scale **(PDSS)**	Emotional Liability Guilt/Shame Anxiety/Insecurity Mental Confusion Suicidal Thoughts Sleeping/Eating Disturbances Loss of Self

The Aga Khan University Anxiety and Depression Scale AKUADS	Anxious Sensation of impending doom Felt unhappy Worried Cried Difficulty in thinking clearly Preferred to be alone Felt hopeless Felt helpless Thought of taking life Sleeping less Loss of appetite Retrosternal pain Indigestion Nausea Constipation Difficulty in breathing Felt tremulous Numbness of hands and feet Tension in neck and shoulders Headaches Pain all over body Passed urine more frequently Lack of interest in daily activities Lost interest in hobbies
Kessler Psychological Distress Scale (K10)	During the last 30 days, About how often did you feel tired out for no good reason About how often did you feel nervous About how often did you feel so nervous that nothing could calm you down About how often did you feel hopeless About how often did you feel restless or fidgety About how often did you feel so restless you could not sit still About how often did you feel depressed

	About how often did you feel that everything was an effort About how often did you feel so sad that nothing could cheer you up About how often did you feel worthless
General Health Questionnaire (GHQ)	Have you recently Been able to concentrate on what you're doing Lost much sleep over worry Felt that you are playing a useful part in things Felt capable of making decisions about things Felt constantly under strain Felt you couldn't overcome your difficulties Been able to enjoy your normal day to day activities Been able to face up to your problems Been feeling unhappy or depressed Been losing confidence in yourself Been thinking of yourself as a worthless person Been feeling reasonably happy, all things considered
The Pregnancy Depression Scale (PDS)	Depressed mood (sad, hopeless, helpless, worthless) Feelings of guilt Work activities Retardation Diurnal variation Fatigability Social withdrawal

Introduction of self-report scales excluded from Chapter 3

General Health Questionnaire (GHQ)

The General Health Questionnaire (GHQ) was developed with the purpose of screening individuals with psychiatric problems in general practice and in the community (Goldberg & Williams, 1988). The original version comprises 60 items. Shorter versions (i.e. GHQ-12 and GHQ-30) were later derived by discarding items relating to specific symptom clusters. For example, the 30-item version excludes

physical symptoms. GHQ-28 was developed using factor analysis of the original questionnaire (Goldberg & Hillier, 1979). The four subscales correspond to the underlying dimensions. Each subscale comprises seven items: somatic symptoms (subscale A), anxiety and insomnia (subscale B), social dysfunction (subscale C), and severe depression (subscale D). GHQ-28 has been validated in both clinic and community settings (e.g. Goldberg & Hillier 1979; Rabins & Brooks 1981; Medina-Mora et al. 1983; Banks 1983; Lobo et al. 1986; Bridges & Goldberg 1986; Goldberg & Bridges 1987; Romans-Clarkson et al. 1989). Median values of sensitivity and specificity of 86 % and 82 % respectively have been obtained from 12 published studies (Goldberg & Williams, 1988). Aderibigbe and Gureje (1992) validated it among 277 Nigerian women against the Psychiatric Assessment Schedule (PAS) and obtained a sensitivity of 82% and a specificity of 85%.

The other shorter versions, such as GHQ-30 have also been validated on pregnant women across different populations. For example, Kitamura, Sugawara, Aoki, and Shima (1989) validated the Japanese version against the semi-structured interview-based on Research Diagnostic Criteria (RDC) as external criteria. They recommended a cut-off value (7/8), higher than that of the English version (4/5). Discriminant function analysis revealed that only 13 items contributed to the discriminatory power. Their discriminant function score was better than a simple summation of the GHQ-30 item scores in terms of validity. However, Kitamura et al. (1994) reported a poor validity of GHQ-30 in third trimester, suggesting a poor performance of the scale to identify psychiatric cases or measure severity at the third trimester. Results of this study have also pointed to the possibility of a difference in nature of diagnosis on different occasions, such that the nature of depression in the first trimester and postpartum may be different from that of the third trimester. Sharp (1988) tested GHQ-30 on 179 pregnant women in early pregnancy in South London and reported an optimum cut-off value of 5/6 to produce a prevalent rate of 35%. However, Swallow et al. (2003) expressed concerns about the validity of the GHQ-28, as it gives rise to higher prevalence rates than the rate found in community samples, indicating possible false positives.

The shorter versions of GHQ has been validated in a variety of populations in China, including school children (Sun, Stewart, Yuan, & Zhang, 2012), adolescents (Li, Chung, Chui, & Chan, 2009), and rural populations (Lee, Yip, Chen, Meng, & Kleinman, 2006). However, evidence against GHQ-12 as a suitable screening tool in Chinese women during the antenatal period has been provided in studies by Martin and Jomeen (2003) and Ip and Martin (2006). Ip and Martin (2006) reported poor test-retest statistics. Unstable factor structures were found and the GHQ-12 has yet to be demonstrated to have replicability of clear and consistent subscale domains. Similarly, Martin and Jomeen (2003) also highlighted the profound impact of the scoring method, making it less appropriate as a screening tool during pregnancy. In addition, the GHQ was also been found to have limitations in screening across ethnic groups. According to Prady et al. (2013), the meaning of the underlying concepts for some items varied between the language of administration and ethnic groups in a large, ethnically diverse subsample of pregnant women within the cohort (Prady et al., 2013). As a result, GHQ was not included in later empirical studies in this thesis.

Patient Health Questionnaire (PHQ)

The PHQ-9 is a nine-item self-report depression screening scale (Kroenke et al. (2001) developed on the criteria from DSM-IV. Participants rate each item according to how frequently they experienced each depressive symptom during the previous two weeks prior to evaluation. The nine assessed symptoms include: (1) anhedonia, (2) depressed mood, (3) insomnia or hypersomnia, (4) fatigue or loss of energy, (5) appetite disturbances, (6) feeling of guilt or worthlessness, (7) diminished ability to think or concentrate, (8) psychomotor agitation or retardation, and (9) suicidal thoughts. Each of the four response categories is assigned a score of 0, 1, 2, or 3, referring to “not at all”, “several days”, “more than half the days” and “nearly every day” respectively. A total score is calculated by summing up individual items, resulting in a range of 0 to 27. A cut-off value of 10 gives rise to 88% of sensitivity and 88% of specificity in

diagnosing possible major depressive disorder (MDD) using the DSM-IV criteria (Kroenke et al. (2001). In another study by Flynn et al. (2011) , however, the EPDS generated a slightly higher percentage of correctly identified cases than the PHQ-9 during pregnancy, suggesting that it may be a better screening tool than the PHQ-9. PHQ-9 has been validated on pregnant women across cultures, such as Côte d′Ivoire and Ghana (Barthel et al., 2015) and Peru (Zhong et al., 2015).

The scale has been widely applied to clinical and community populations (Gilbody, Richards, Brealey, & Hewitt, 2007) and postpartum populations (Gjerdingen, Crow, McGovern, Miner, & Center, 2009). Flynn and colleagues (2011) and Sidebottom et al. (2012) have recently validated PHQ-9 on a sample of pregnant women. Sidebottom et al. (2012) used a structured diagnostic interview (SCID). They reported a high sensitivity (85 %) and specificity (84 %), compared with the sensitivity (74%) and specificity (73%) reported by Flynn et al. (2011) based on unstructured clinical interviews of DSM-IV criteria. In comparison with shorter versions of PHQ, PHQ-9 has a higher sensitivity than that of PHQ-8 (54%) with suicidal ideation omitted on pregnant women using a structured diagnostic interview (Smith et al., 2010). Similar specificity was found (84 %) for both PHQ-9 and PHQ-8 on pregnant women. In addition, PHQ-2 is also found to perform equally well as PHQ-8, suggesting its adequacy as a screening instrument for MDD in pregnancy (Smith et al., 2010).

PHQ-9 has been used in the US as a primary screening tool and as a confirmatory test in women with elevated EPDS scores (>10). It helps to confirm elevated risk and depression severity. During therapy the PHQ-9 has also been used to monitor response to therapy as an outcome measure (as cited in Yawn et al., 2015). Its high sensitivity to depressive severity makes it a useful outcome measure in clinical trials. However, PhQ-9 has not been validated on Chinese pregnant samples and so is not suitable to be used in the later empirical studies in this thesis.

The Inventory of Depressive Symptomatology, self-report version (IDS-SR)

The 30-item Inventory of Depressive Symptomatology, self-report version (IDS-SR) was developed in 1996 to assess 9 criterion domains standardized by DSM-IV (Rush et al., 1996). It has been shown in previous studies to demonstrate adequate psychometric characteristics for screening for a major depressive disorder (Rush et al., 1996 Trivedi et al., 2004), including a high internal consistency (>0.8). A high sensitivity to symptom change and high concurrent validity have also been reported. IDS-SR was translated into various languages and is readily available for free download. Brunoni et al. (2013) were the first to validate the IDS-SR on 543 pregnant women via PRIME-MD in accordance with the DSM-IV-TR. This study reported a Cronbach's alpha of 0.89 and a high sensitivity and specificity > 80%. A two-factor model was found to best fit the data (mood/cognitive and irritability/anxiety/pain). Importantly, the mood/cognitive factor accounted for 40% of the total variance and was found to adequately identify antenatal depression.

In the Chinese population, the IDS-SR 30 has been validated in a group of 64 Chinese depressed outpatients with a high Cronbach's alpha (0.805) and high Pearson correlation coefficients between the other symptom measures (0.738 to 0.882) (Wu, Yin, Xu, Carmody, & Morris, 2010). In addition, Liu et al. (2012) tested the psychometric properties of the 16-item IDS-SR on 998 patients. The study also reported good internal consistency (Cronbach's alpha between 0.73 and 0.82) and a high correlation with the HAMD total score. The scale also showed uni-dimensionality in exploratory factor analyses (Liu et al., 2012), and demonstrated good psychometric properties on 30 depressed Chinese Americans, including sensitivity and specificity around 0.8 (Yeung et al., 2012). However, the IDS-SR has only been validated on general depressed patients. To date, no study has presented its psychometric properties with pregnant women in China. Therefore, a limited number of studies hinder drawing a conclusion that it works well for antenatal depression. IDS-SR is thus not suitable for the empirical studies.

How I feel Scale

The *How I Feel* scale (Goldenberg et al., 1997) was developed from five existing psychosocial scales including the State-Trait Anxiety Inventory (Spielberger (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) et al., 1970), Rosenberg self-esteem scale (Rosenberg, 1965), Pearlin mastery scale (Pearlin, Menaghan, Lieberman, & Mullan, 1981), Center for Epidemiological Studies-Depression scale (Radloff, 1977), and Schar Subjective Stress scale (Schar et al., 1973, cited in Goldenberg et al., 1997). It aims to predict gestational age, pre-term delivery, birth weight, and fetal growth restriction. The initial symptom pool was administered to 842 black and 381 white pregnant women at 24-26 weeks gestation. The 59 items were then pooled and investigated for redundancy. Using principal factor analysis, primary factors were identified. Regression analysis confirmed that an abbreviated 28-item scale, referred to as *How I Feel* scale, could provide similar information to the full scale. Each item on the *How I Feel* scale has five response options to be rated. The response options for items 1-19 are Never, Rarely, Sometimes, Often, and Almost always. The response options for items 20-28 are 'Strongly agree', 'Somewhat agree', 'Undecided', 'Somewhat disagree', and 'Strongly disagree'. Scores on the scale may range from 1 to 140, with a larger score indicating better psychosocial functioning.

The *How I Feel Scale* has also been validated in Pakistani pregnant women with good psychometric characteristics (Karmaliani, Bann, Pirani, et al., 2007). The scale was shown to have a high Cronbach's alpha (>0.8) and good ability to discriminate between patients with or without a psychological disorder. (Karmaliani, Bann, Mahmood, et al., 2007) reported a single-factor structure of the *How I Feel scale* (psychological functioning) and good discrimination ability of individual items. The finding by also pointed to cultural differences in depression expression. For example, "Little I can do to change important things in my life" performed poorly on Pakistani women, suggesting that the scale may not be culturally sensitive.

The *How I Feel Scale* has the strength of including psychosocial factors in depression assessment making it more useful in predicting postnatal depression (Austin et al., 2013). However, it has been developed with women at 24-26 weeks gestation. This characteristic restricts its usability when screening is implemented during the first and third trimester. As the optimal timing for screening is still undetermined (Yawn et al., 2015), screening at first antenatal visit and at 34-36 weeks of gestation could benefit pregnant women (Faisal-Cury & Menezes, 2012; Sutter-Dallay, et al., 2012), especially when studies have demonstrated a higher prevalence in the third trimester than in other periods (Section 2.2). However, The *How I Feel Scale* has not been tested on Chinese pregnant sample and so is not suitable to be used in the following empirical chapters.

Hospital Anxiety and Depression Scale-Depression Subscale (HADS-D)

The Hospital Anxiety and Depression Scale was developed by Zigmond and Snaith (1983), with items related to the biological aspect of depression excluded to facilitate its use in physically ill populations. The depression subscale contains 7 items rated on a 0-3 scale. Extensive investigation of its psychometric properties across various populations were conducted and reviewed. For example, Bjelland, Dahl, Haug, and Neckelmann (2002) retrieved 747 validation studies of HADS and 71 relevant papers in their review. A Cronbach's alpha above 0.6 was reported in all studies. A cut-off value of 8 gives rise to sensitivity and specificity of approximately 0.80.

Despite the acceptable psychometric characteristics that HADS-D showed in clinical and community settings (Bjelland et al., 2002), concerns were raised about HADS as a suitable screening tool during pregnancy. For example, Jomeen and Martin (2004) examined the factor structure of HADS on 101 pregnant women and reported an ambiguous factor structure in terms of interpretation. Their three-factor model showed a split loading in the depression subscale and a relatively consistent anxiety subscale,

which challenged previous findings. Karimova and Martin (2003) found an unacceptable internal reliability of the depression subscale of HADS for clinical applicability, as well as an unacceptable test-retest reliability. A factor analysis of HADS failed to support the hypothesized two-subscale structure at both early and late stages of pregnancy. In a Chinese sample, Xia (2006) investigated 287 pregnant women in Kunshan, Jiangsu Province and reported a Cronbach's alpha of 0.86. A two-factor model emerged from the study and a cut-off value of 9 gave rise to good sensitivity and specificity. However, the sample size in this study is relatively small to sufficiently represent general pregnant women in China. To date, no evidence has been presented on the psychometric properties of the HADS-D on pregnant women in China. Due to a lack of validation study, HADS-D will not be included in subsequent empirical studies in this thesis.

The Kessler Psychological Distress Scale (K-10)

The K10 is a 10-item self-rating scale that measures symptoms of anxiety and depression during a four-week period. It was developed from large general population samples using item response theory methods (Kessler et al., 2002). It has been adopted in the redesigned US National Health Interview Survey (NHIS), the Canadian NHIS, the Australian National Survey of Health and Wellbeing and the World Health Organization's World Mental Health Initiative (Furukawa, Kessler, Slade, & Andrews, 2003). Since its development, the K10 has been translated into various languages, including Mandarin Chinese (Kessler, 2006). The items were reported to be free from socio-cultural influence and biases on gender and education (Baillie, 2005). The K-10 is in favour in Africa even more than clinician-administered diagnostic interviews (Spies et al., 2009). This is because the K-10 has the advantage in its convenience in administration and scoring which can easily be implemented in low resources settings and is convenient to be used by overburdened healthcare workers. Furthermore, its generic symptom content facilities its use as a screening tool across primary care including perinatal populations.

However, despite its wide validation in general populations (e.g. Baggaley et al. 2007; Spies et al. 2009), K-10 has seldom been validated for use with pregnant women. Fernandes et al. (2011) validated it among 194 women in their third trimester of pregnancy in a rural prenatal clinic in Karnataka, South India. Their study demonstrated that K10 is a good screening instrument (sensitivity = 100%, specificity = 81.30%). In a Chinese population, the 6-item Kessler psychological distress scale has been validated on undergraduates (Kang et al., 2015). However, a lack of evidence from validation studies makes it difficult to draw conclusions on its suitability for use with Chinese pregnant women. It will thus not be included in empirical studies in this thesis.

The Aga Khan University Anxiety and Depression Scale (AKUADS)

The AKUADS is a 25-item self-report questionnaire (13 psychological and 12 somatic items) to be used in the Pakistani community (Karmaliani, Bann, Mahmood, et al., 2007). Response on each item is on a 4 point Likert scale (never, sometimes, often, always) scoring from 0 to 3. The scale has been shown to be a valid screening tool in community settings (Ali et al., 2002) and possesses acceptable sensitivity and specificity (66% and 79% respectively). Karmaliani and colleagues (2007) investigated the psychometric characteristics of 200 pregnant women in Pakistan against the DSM-IV criteria. They found a good performance of the AKUADS, including a Cronbach's alpha greater than 0.80 and a good level of discrimination for the total score. The study also identified the cultural expression in Pakistani pregnant women, and that despite somatization in the expression of depression in the Pakistani community sample, somatic symptoms are less useful indicators to discriminate depression in pregnant women. The AKUADS has only been validated and used among Pakistani women. It lacks sufficient evidence to be generalized to Chinese and other populations and thus it is not suitable to be used in the following empirical studies.

Zung Self-Rating Depression Scale (SDS)

The Zung Self-rating Depression Scale (Zung SDS) (Zung, 1965) is a 20-item self-report questionnaire with items in a 4-point Likert scale. The items are constructed based on the diagnostic criteria for depression. It was originally conceptualized as three domains: pervasive affect (e.g., crying spells), physiological equivalents (e.g., insomnia), and psychological equivalents (e.g., hopelessness). To date, the only validation of the SDS is from Kitamura et al. (1994). They administrated the SDS and GHQ on pregnant women across various periods of pregnancy: first trimester, third trimester, 5 days postnatal and one month postnatal. The validity of SDS is reduced at the third trimester and at 5 days postpartum, given its failure to maintain the sensitivity at these time points. However, SDS has not been tested on Chinese pregnant sample and so is not suitable to be used in the following empirical studies.

Appendix E Information Sheet for study 1

SCHOOL of HEALTH IN SOCIAL SCIENCE
The University of Edinburgh
The Medical School
Teviot Place
Edinburgh EH8 9AG
Telephone 0131 650 1000
or direct dial 0131 650
Fax 0131 650 3891

Project Title: Validating a new multidimensional depression assessment scale and examining the psychometrics with a clinical sample

Chief Investigator: Ho Nam Cheung

Organization: The University of Edinburgh

Participant Information Sheet

We would like to invite you to take part in our study. It aims to validate a newly developed multidimensional depression assessment scale. Before you decide we would like you to understand what is involved in the study and why the study is done. Part 1 tells you the purpose of the study and what will happen to you if you take part. Part 2 gives you more detailed information about the conduct of the study. We could go through the information sheet with you. We also encourage you to ask any questions you have.

Part 1

Purpose of the study

As a PhD project, a 52-item depression assessment scale which consists of depressive symptoms in emotion, cognitive, somatic, and interpersonal domains has been developed. In order to make it useful for clinicians and in mental health research, we aim to validate the new scale. We intend to look at its ability in assessing depressive symptom severity and symptom pattern. We also believe that it is more reliable than other depression scales being in use currently.

Why are you invited?

In the new depression scale we listed all the possible condition you are experiencing. Therefore, your score on the new scale is a very useful indicator of its performance.

Do I have to take part?

It is up to you to decide whether to join the study. We could explain the study and go through this information sheet with you. If you agree to take part, we will like you to return the completed questionnaire. You are free to withdraw at any time, without giving a reason.

What will you have to do?

In this straightforward study we would like you to complete the questionnaire you receive, and return it to us together with signed consent form by post with the prepaid envelope. If you wish to participate without signing the consent form please make sure you have read and understood it before you send us back the completed questionnaire.

When a problem occurs

During the study if you experience any discomfort, we will advise you to stop the study immediately. You are encouraged to talk to Prof. Mick Power (Clinical Psychologist) at mjpower@staffmail.ed.ac.uk. Dr. Dong Sheng Yu, principle psychiatrist, is in charge of all the counselling service provided in the hospital. He has reviewed the questionnaire. You are welcome to seek profession advice from him (86 13948611221).

Confidentiality

We will follow ethical and legal practice and all information about you will be handled in confidence. The details are included in Part 2.

If the information in Part 1 has interested you and you are considering participation, please read the additional information in Part 2 before making any decision.

Part 2

If you have any complaints

If you have a concern about any aspect of this study, you could speak to Prof. Mick Power who will do his best to answer your questions.

Confidentiality

All information collected about you during the course of the research will be kept strictly confidential. The questionnaires will be stored in a locked cabinet and only we

have the keys. We will also store the questionnaires in electronic form protected by password.

Who reviewed the study?

This study has been reviewed and given favourable opinion by Research Ethics Committee at the University of Edinburgh, School of Health in Social Science. It has also been reviewed and approved by the mental hospital, Inner Mongolia.

Publication of the result

The result of the study will be published in scientific journals and PhD thesis.

Further information and contact person

If you are unhappy with the study, please contact
Ho Nam Cheung at 861308150710/ hnamy86@hotmail.com or
Prof. Mick Power at mjpower@staffmail.ed.ac.uk / 4401316513972.

Contact person if you have any queries:

Researcher's name: Ho Nam Cheung
Mobile number: 86 13081507170
Email: hnamy86@hotmail.com/s0898821@sms.ed.ac.uk

Appendix F Study 2 participants Information sheet

SCHOOL of HEALTH IN SOCIAL SCIENCE
The University of Edinburgh
The Medical School
Teviot Place
Edinburgh EH8 9AG
Telephone 0131 650 1000
or direct dial 0131 650
Fax 0131 650 3891

Project Title: Examining the properties of the new multidimensional depression assessment scale on pregnant women.

Chief Investigator: Ho Nam Cheung

Organization: The University of Edinburgh

Participant Information Sheet

We would like to invite you to take part in our study. It aims to examine the psychometric properties of a newly developed multidimensional depression assessment scale to be used on pregnant women. Before you decide we would like you to understand what is involved in the study and why the study is done. Part 1 tells you the purpose of the study and what will happen to you if you take part. Part 2 gives you more detailed information about the conduct of the study. We could go through the information sheet with you. We also encourage you to ask any questions you have.

Part 1

Purpose of the study

As a PhD project, a 52-item depression assessment scale, which consists of depressive symptoms in emotion, cognitive, somatic, and interpersonal domains, has been developed. Apart from including a complete spectrum of depressive symptoms, it also adds to the already-developed scales interpersonal aspects of depression. And we believe that it could contribute to screening of antenatal depression. In order to make it useful for pregnant women, we aim to examine the new scale. We intend to look at its ability in measuring depressive symptom severity and symptom pattern during pregnancy. We also believe that it is more reliable than other depression scales being in use currently.

Do I have to take part?

It is up to you to decide whether to join the study. We could explain the study and go through this information sheet with you. If you agree to take part, we will like you to return the completed questionnaire. You are free to withdraw at any time, without giving a reason.

What will you have to do?

In this straightforward study we would like you to complete the questionnaire set you receive and return it to the nurses at the reception.

Confidentiality

We will follow ethical and legal practice and all information about you will be handled in confidence. The details are included in Part 2.

If the information in Part 1 has interested you and you are considering participation, please read the additional information in Part 2 before making any decision.

Part 2

Confidentiality

All information collected about you during the course of the research will be kept strictly confidential. The questionnaires will be stored in a locked cabinet and only we have the keys. We will also store the questionnaires in electronic form protected by password.

Who reviewed the study?

This study has been reviewed and given favourable opinion by Research Ethics Committee at the University of Edinburgh, School of Health in Social Science. The ethics committee at antenatal clinic has also reviewed the study.

Publication of the result

The result of the study will be published in scientific journals and PhD thesis.

Further information and contact person

If you are unhappy with the study please contact Ho Nam Cheung at hnamy86@hotmail.com or Prof. Mick Power at mjpower@staffmail.ed.ac.uk.

Contact person if you are interested in taking part:

Researcher's name: Ho Nam Cheung
Mobile number: 86 471 6938055 (China)
Email: hnamy86@hotmail.com/s0898821@sms.ed.ac.uk

Appendix G Consent form for study 1

SCHOOL of HEALTH IN SOCIAL SCIENCE
The University of Edinburgh
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Telephone 0131 650 1000
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同意书

研究课题: 内蒙古抑郁症病人的病症调研

研究者: 张浩南（爱丁堡大学博士生）

研究机构：爱丁堡大学，健康科学院

请打勾

我已阅读和明白研究章程。我仔细考虑其中的细则，我的疑问也得到满意的解答。	☐
我明白我的参与是自愿性质的。我可以自由决定何时退出研究，不需要给予任何理由。我所得到的医疗护理和合法权利不会受到任何影响。	☐
我同意让我的主治医师知道我参与上述研究	☐
我同意参与上述研究	☐

请提供您的联系方式

姓名：_____

地址：

_____

_____

电话号码：_____邮箱：_____

签署：_____ 日期：_____

非常感谢您的参与。

研究者签名：_____ 日期：_____

Appendix H Consent form for study 2

SCHOOL of HEALTH IN SOCIAL SCIENCE
The University of Edinburgh
The Medical School
Teviot Place
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Telephone 0131 650 1000
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Fax 0131 650 3891

同意书

研究课题: 内蒙古怀孕妇女的抑郁状况调研

研究者: 张浩南（爱丁堡大学博士生）

研究机构：爱丁堡大学，健康科学院

	请打勾
我已阅读和明白研究章程。我仔细考虑其中的细则，我的疑问也得到满意的解答。	☐
我明白我的参与是自愿性质的。我可以自由决定何时退出研究，不需要给予任何理由。我所得到的医疗护理和合法权利不会受到任何影响。	☐
我同意让我的主治医师知道我参与上述研究	☐
我同意参与上述研究	☐

请提供您的联系方式

姓名：_____

地址：

_____

_____

电话号码：_____邮箱：_____

签署：_____ 日期：_____

非常感谢您的参与。

研究者签名：_____ 日期：_____

Appendix I Questionnaire used in study 1

SCHOOL of HEALTH IN SOCIAL SCIENCE
The University of Edinburgh
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Telephone 0131 650 1000
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课题名称：内蒙古抑郁症病人的病症调研

研究者： 张浩南 (博士生)

研究机构：爱丁堡大学，健康科学院

第一部分：基本信息

1.你的年纪是：_____

2. 你的性别是：男 / 女

3.你最高的学历是：

____小学毕业

____初中毕业

____高中毕业

____本科 / 大专

____硕士或以上

____无承认学历

4.婚姻状况： 未婚 / 已婚 / 离异 / 配偶去世

5.你的就业状况是：

____全职

____求学

____失业

____其他，请注明_____

身体和心理健康情况

1. 你是否曾经患上任何身体疾病？　　是 / 否

2. 你是否曾经或正在接受治疗 / 服用药物？　是 / 否

3. 你是否曾经患上忧郁症？　　是 / 否

4. 你是否曾经或正在接受治疗 / 服用药物？　是 / 否

第二部分：多维忧郁症检测表 MDAS

请仔细阅读问卷，然后在 1－5 中，选出在去两周内（包括今天），最能代表你的感受的数字。

你是否常常感到：	**并不是**	**很少**	**颇为常见**	**经常**	**大部分时间**
1. 情绪低落	1	2	3	4	5
2. 悲伤	1	2	3	4	5
3. 精神不振	1	2	3	4	5
4. 沮丧	1	2	3	4	5
5. 心情忧郁	1	2	3	4	5
6. 内疚	1	2	3	4	5
7. 不快乐	1	2	3	4	5
8. 不愉快	1	2	3	4	5
9. 暴躁易怒	1	2	3	4	5
10. 烦躁不安	1	2	3	4	5
11. 羞耻	1	2	3	4	5
12. 紧张	1	2	3	4	5
13. 绝望	1	2	3	4	5

14. 对事物失去兴趣	1	2	3	4	5
15. 找不到乐趣	1	2	3	4	5
16. 感觉未来渺茫	1	2	3	4	5
17. 觉得自己没有价值	1	2	3	4	5
18. 注意力不集中	1	2	3	4	5
19. 责备自己	1	2	3	4	5
20. 感觉人生没意义	1	2	3	4	5
21. 觉得自己失败	1	2	3	4	5
22. 反复回想自己的悲伤和让自己悲伤的事情	1	2	3	4	5
23. 有自杀念头	1	2	3	4	5
24. 很难做决定	1	2	3	4	5
25. 没有精力	1	2	3	4	5
26. 睡眠出现问题	1	2	3	4	5
27. 胃口改变	1	2	3	4	5
28. 性欲减低	1	2	3	4	5
29. 动作语言减慢	1	2	3	4	5
30. 疲倦	1	2	3	4	5
31. 体重改变	1	2	3	4	5
32. 哭泣	1	2	3	4	5
33. 烦乱	1	2	3	4	5
34. 动作缓慢	1	2	3	4	5
35. 对疼痛反应更敏感	1	2	3	4	5
36. 消化能力下降	1	2	3	4	5
37. 活动能力下降	1	2	3	4	5
38. 脱离社交活动	1	2	3	4	5
39. 觉得自己比别人差	1	2	3	4	5
40. 觉得自己是别人的负担	1	2	3	4	5

41. 逃避社交活动	1	2	3	4	5
42. 觉得自己不值得别人的关心	1	2	3	4	5
43. 对别人的批评过度敏感	1	2	3	4	5
44. 觉得魅力比别人少	1	2	3	4	5
45. 对别人的语言行为太过敏感	1	2	3	4	5
46. 觉得别人让自己失望	1	2	3	4	5
47. 难以爱别人	1	2	3	4	5
48. 对别人有敌意	1	2	3	4	5
49. 记忆力下降	1	2	3	4	5
50. 无法做出规划／计划	1	2	3	4	5
51. 感觉杂乱无章	1	2	3	4	5
52. 无法照料自己	1	2	3	4	5

第二部分 贝克抑郁自评量表(BDI)

说明： 这问卷共有21题，每一题包含几个不同的叙述，请你仔细阅读每一题中的每个叙述，然后选一项你最近七天（包括今天）来的感受的叙述，并请你把该叙述的号码圈起来。若你觉得有几个叙述同样适合你，则请圈选在这一组中，数字最高的那一个句子。请注意任何一组，包括第16组（睡眠习惯的改变），或第18组（食欲改变），都只能圈选一个句子。请将每个叙述都看过之后，再选出最适当者。

A:
0.我不感到忧愁
1.我感到忧愁
2.我整天都感到忧愁，且不能改变这种情绪
3.我非常忧伤或不愉快，以致我不能忍受

B:
0.对于将来我不感到悲观
1.我对将来感到悲观
2.我感到没有什么可指望的
3.我感到将来无望，事事都不能变好

K：
0．我并不比以往容易激惹
l. 我比以往容易激惹或容易生气
2．我现在经常容易发火
3. 以往能激惹我的那些事情现在则完全不能激惹我了

L:
0．我对他人的兴趣没有减少
1．我对他人的兴趣比以往减少了
2．我对他人丧失了大部分兴趣
3．我对他人现在毫无兴趣

C：
0.我不象一个失败者
1.我觉得我比一般人失败的次数多些
2.当我回首过去我看到的是许多失败
3.我感到我是一个彻底失败了的人

D：
0.我对事物象往常一样满意
1.我对事物不象往常一样满意
2.我不再对任何事物感到真正的满意
3.我对每件事都不满意或讨厌

E：
0. 我没有特别感到内疚
1. 在相当一部分时间内我感到内疚
2.在部分时间里我感到内疚
3.我时刻感到内疚

F：
0．我没有感到正在受惩罚
1. 我感到我可能受惩罚
2．我预感会受惩罚
3．我感到我正在受惩罚

G:
0．我感到我并不使人失望
1．我对自己失望
2．我讨厌自己
3．我痛恨自己

H：
0．我感觉我并不比别人差
1．我对自己的缺点和错误常自我反省
2．我经常责备自己的过失
3．每次发生糟糕的事我都责备自己

I：
0．我没有任何自杀的想法
1．我有自杀的的念头但不会真去自杀
2．我很想自杀
3．如果我有机会我就会自杀

M：
0．我与以往一样能作决定
1．我现在作决定没有以前果断
2．我现在作决定比以前困难得多
3．我现在完全不能作决定

N：
0．我觉得自己看上去和以前差不多
1．我担心我看上去老了或没有以前好看了
2．我觉得我的外貌变得不好看了，而且是永久性的改变
3．我认为我看上去很丑了

O：
0．我能象以往一样工作
1．我要经一番特别努力才能开始做事
2．我做任何事都必须作很大的努力，强迫自己去做
3．我完全不能工作

P：
0．我睡眠象以往一样好
1．我睡眠没有以往那样好
2．我比往常早醒 l～2 小时，再入睡有困难
3．我比往常早醒几个小时．且不能再入睡

Q：
0．我现在并不比以往感到容易疲劳
1．我现在比以往容易疲劳
2．我做任何事都容易疲劳
3．我太疲劳了以致我不能做任何事情

R：
0．我的食欲与以前一样好
1．我现在食欲没有往常那样好
2．我的食欲现在差多了
3．我完全没有食欲了

S：
0．我最近没有明显的体重减轻
1．我体重下降超过 5 斤
2．我体重下降超过 10 斤
3．我体重下降超过 15 斤，我在控制饮食来减轻体重

J：
0．我并不比以往爱哭
1．我现在比以前爱哭
2．现在我经常哭
3．我以往能哭，但现在即使我想哭也哭不出来

T：
0．与以往比我并不过分担心身体健康
1．我担心我身体的毛病如疼痛、反胃及便秘
2．我很着急身体的毛病而妨碍我思考其他问题
3. 我非常着急身体疾病，以致不能思考任何其它事情

U：
0．我的性欲最近没有什么变化
1．我的性欲比以往差些
2．现在我的性欲比以往减退了许多
3．我完全丧失了性欲

第四部分：社交活动

在过去 3 个月内，你参与以下活动的频率为：

	从不	很少	有时	经常
看电影				
戏剧／演唱会				
观看室内运动比赛				
美术馆／博物馆				
展览				
到有兴趣的地方逛逛				
跟朋友见面，聊天				
晚间学校				
探望亲戚				
亲戚来探望你				

探望朋友				
朋友来探望你				
派对 / 朋友聚会				
正式社交场合				
迪斯科				
夜店				
进行室内运动				
进行户外运动				
参加兴趣班				
酒吧				
外出用餐				
教会活动				

(*包括男性 / 女性朋友 / 恋人)

问卷结束，谢谢您的参与。

Appendix J Questionnaire used in study 2 and 3

SCHOOL of HEALTH IN SOCIAL SCIENCE
The University of Edinburgh
The Medical School
Teviot Place
Edinburgh EH8 9AG
Telephone 0131 650 1000
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Project Title: Antenatal Depression in Inner Mongolia pregnant women

课题名称：内蒙古怀孕妇女的产前抑郁症调查

Investigator: Ho Nam Cheung

研究者： 张浩南

Institute: University of Edinburgh, School of Health

研究机构：爱丁堡大学，健康科学院

第一部分：基本信息

1.你的年龄是：	
2.你最高的学历是：	____小学毕业 ____初中毕业 ____高中毕业 ____本科 ____硕士或以上 ____无承认学历
5.你的就业状况是：	____全职

	____求学 ____失业 ____其他，请注明
6. 您的职业是：	____专业人员 （管理，专业技能） ____行政人员 （技术工作，销售，行政支援工作） ____服务人员 （服务行业） ____工匠 （精确制造，工艺，修理） ____劳动人员 （操作人员，劳动工作） ____其他，请注明
7.你每周平均工作时数是	
8.你怀孕多少周	
9. 你是否正怀第一胎？	是／否
10.你是否曾经小产或终止怀孕？	是／否

身体和心理健康情况

1. 你是否曾经患上任何身体疾病？ 是／否
2. 你是否曾经或正在接受治疗／服用药物？ 是／否
3. 你是否曾经患上忧郁症？ 是／否
4. 你是否曾经或正在接受治疗／服用药物？ 是／否

第二部分：多维忧郁症检测表 MDAS

请仔细阅读问卷，然后在 1－5 中，选出在过去两周内（包括今天），最能代表你的感受的数字。1 代表并不是，5 代表大部分时间都是。

Items					
你是否常常感到：	**并不是**	**很少**	**颇为常见**	**经常**	**大部分时间**
53. 情绪低落	1	2	3	4	5
54. 悲伤	1	2	3	4	5
55. 精神不振	1	2	3	4	5
56. 沮丧	1	2	3	4	5
57. 心情忧郁	1	2	3	4	5
58. 内疚	1	2	3	4	5
59. 不快乐	1	2	3	4	5
60. 不愉快	1	2	3	4	5
61. 暴躁易怒	1	2	3	4	5
62. 烦躁不安	1	2	3	4	5
63. 羞耻	1	2	3	4	5
64. 紧张	1	2	3	4	5
65. 绝望	1	2	3	4	5

66. 对事物失去兴趣	1	2	3	4	5
67. 找不到乐趣	1	2	3	4	5
68. 感觉未来渺茫	1	2	3	4	5
69. 觉得自己没有价值	1	2	3	4	5
70. 注意力不集中	1	2	3	4	5
71. 责备自己	1	2	3	4	5
72. 感觉人生没意义	1	2	3	4	5
73. 觉得自己失败	1	2	3	4	5
74. 反复回想自己的悲伤和让自己悲伤的事情	1	2	3	4	5
75. 有自杀念头	1	2	3	4	5
76. 很难做决定	1	2	3	4	5
77. 没有精力	1	2	3	4	5
78. 睡眠出现问题	1	2	3	4	5
79. 胃口改变	1	2	3	4	5
80. 性欲减低	1	2	3	4	5
81. 动作语言减慢	1	2	3	4	5
82. 疲倦	1	2	3	4	5
83. 体重改变	1	2	3	4	5
84. 哭泣	1	2	3	4	5
85. 烦乱	1	2	3	4	5
86. 动作缓慢	1	2	3	4	5
87. 对疼痛反应更敏感	1	2	3	4	5
88. 消化能力下降	1	2	3	4	5
89. 活动能力下降	1	2	3	4	5
90. 脱离社交活动	1	2	3	4	5
91. 觉得自己比别人差	1	2	3	4	5
92. 觉得自己是别人的负担	1	2	3	4	5

93. 逃避社交活动	1	2	3	4	5
94. 觉得自己不值得别人的关心	1	2	3	4	5
95. 对别人的批评过度敏感	1	2	3	4	5
96. 觉得魅力比别人少	1	2	3	4	5
97. 对别人的语言行为太过敏感	1	2	3	4	5
98. 觉得别人让自己失望	1	2	3	4	5
99. 难以爱别人	1	2	3	4	5
100. 对别人有敌意	1	2	3	4	5
101. 记忆力下降	1	2	3	4	5
102. 无法做出规划／计划	1	2	3	4	5
103. 感觉杂乱无章	1	2	3	4	5
104. 无法照料自己	1	2	3	4	5

第二部分 贝克抑郁自评量表(BDI-II)

指导语：这个问卷由许多组项目组成，请仔细看每组的项目，然后在每组内选择最适合你现在情 况〔最近一周，包括今天〕的一项描述，并将那个数字圈出。请先读完一组内的各项叙述，然后选择。

A:
0.我不感到忧愁
1.我感到忧愁
2.我整天都感到忧愁，且不能改变这种情绪
3.我非常忧伤或不愉快，以致我不能忍受

B:
0.对于将来我不感到悲观
1.我对将来感到悲观
2.我感到没有什么可指望的
3.我感到将来无望，事事都不能变好

C：
0.我不象一个失败者

K：
0．我并不比以往容易激惹
1．我比以往容易激惹或容易生气
2．我现在经常容易发火
3. 以往能激惹我的那些事情现在则完全不能激惹我了

L:
0．我对他人的兴趣没有减少
1．我对他人的兴趣比以往减少了
2．我对他人丧失了大部分兴趣
3．我对他人现在毫无兴趣

M：
0．我与以往一样能作决定

1.我觉得我比一般人失败的次数多些
2.当我回首过去我看到的是许多失败
3.我感到我是一个彻底失败了的人

D：
0.我对事物象往常一样满意
1.我对事物不象往常一样满意
2.我不再对任何事物感到真正的满意
3.我对每件事都不满意或讨厌

E：
0. 我没有特别感到内疚
1. 在相当一部分时间内我感到内疚
2.在部分时间里我感到内疚
3.我时刻感到内疚

F：
0．我没有感到正在受惩罚
1. 我感到我可能受惩罚
2．我预感会受惩罚
3．我感到我正在受惩罚

G:
0．我感到我并不使人失望
1．我对自己失望
2．我讨厌自己
3．我痛恨自己

H：
0．我感觉我并不比别人差
1．我对自己的缺点和错误常自我反省
2．我经常责备自己的过失
3．每次发生糟糕的事我都责备自己

I：
1．我现在作决定没有以前果断
2．我现在作决定比以前困难得多
3．我现在完全不能作决定

N：
0．我觉得自己看上去和以前差不多
1．我担心我看上去老了或没有以前好看了
2．我觉得我的外貌变得不好看了，而且是永久性的改变
3．我认为我看上去很丑了

O：
0．我能象以往一样工作
1．我要经一番特别努力才能开始做事
2．我做任何事都必须作很大的努力，强迫自己去做
3．我完全不能工作

P：
0．我睡眠象以往一样好
1．我睡眠没有以往那样好
2．我比往常早醒 l～2 小时，再入睡有困难
3．我比往常早醒几个小时．且不能再入睡

Q：
0．我现在并不比以往感到容易疲劳
1．我现在比以往容易疲劳
2．我做任何事都容易疲劳
3．我太疲劳了以致我不能做任何事情

R：
0．我的食欲与以前一样好
1．我现在食欲没有往常那样好
2．我的食欲现在差多了
3．我完全没有食欲了

S：

0．我没有任何自杀的想法
1．我有自杀的的念头但不会真去自杀
2．我很想自杀
3．如果我有机会我就会自杀

0．我最近没有明显的体重减轻
1．我体重下降超过 5 斤
2．我体重下降超过 10 斤
3．我体重下降超过 15 斤，我在控制饮食来减轻体重

J：
0．我并不比以往爱哭
1．我现在比以前爱哭
2．现在我经常哭
3．我以往能哭，但现在即使我想哭也哭不出来

T：
0．与以往比我并不过分担心身体健康
1．我担心我身体的毛病如疼痛、反胃及便秘
2．我很着急身体的毛病而妨碍我思考其他问题
3．我非常着急身体疾病，以致不能思考任何其它事情

U：
0．我的性欲最近没有什么变化
1．我的性欲比以往差些
2．现在我的性欲比以往减退了许多
3．我完全丧失了性欲

第三部分 爱丁堡抑郁量表 EPDS

在过去七天，包括今天：（请圈上您的答案）

A. 我能看到事情有趣的一面，并笑得开心：

- 同以前一样
- 没有以前那么多
- 肯定比以前少
- 完全不能

B. 我欣然期待未来的一切：

- 同以前一样
- 没有以前那么多
- 肯定比以前少
- 完全不能

F. 当很多事情冲着我而来，使我透不过气：

- 大多数时候我都不能应付
- 有时候我不能像平时那样应付得好
- 大部分时候我可以应付自如
- 一直都能应付得很好

G. 我很不开心，以致失眠：

- 大部分时候这样
- 有时候这样
- 不经常这样
- 没有这样

C. 当事情出错时，我会不必要地责备自己：

- 大部分时候这样
- 有时候这样
- 不经常这样
- 没有这样

D. 我无缘无故感到焦虑和担心：

- 一点也没有
- 极少有
- 有时候这样
- 经常这样

E. 我无缘无故感到害怕和惊慌：

- 相当多时候这样
- 有时候这样
- 不经常这样
- 一点也没有

H. 我感到难过和悲伤：

- 大部分时候这样
- 颇经常这样
- 不经常这样
- 没有这样

I. 我不开心到哭：

- 大部分时候这样
- 颇经常这样
- 不经常这样
- 没有这样

J. 我想过要伤害自己：

- 颇经常这样
- 有时候这样
- 很少这样
- 从来没有

第四部分：社交活动量表

在过去 3 个月内，你参与以下活动的频率为：

	从不	很少	有时	经常
看电影				
戏剧 / 演唱会				
观看室内运动比赛				

美术馆／博物馆				
	从不	**很少**	**有时**	**经常**
展览				
到有兴趣的地方逛逛				
跟朋友见面，聊天				
晚间学校				
探望亲戚				
亲戚来探望你				
探望朋友				
朋友来探望你				
派对／朋友聚会				
正式社交场合				
迪斯科				
夜店				
进行室内运动				
进行户外运动				
参加兴趣班				
酒吧				
外出用餐				
教会活动				

第五部分：亲人朋友的支持

请在以下的 6 个空格中，尽量填写 6 位与你关系最密切的人（例如丈夫，妻子，父亲，母亲，朋友）。请用 1－7 来表示你从他们那里实际得到的支持。并且用 1－7 表示你希望从他们身上得到的支持。

1……

		从不			偶尔			经常
1	a) 你可否信任他／她，坦白地跟他／她分享你的感受	1	2	3	4	5	6	7
	b) 你心目中理想的评分是	1	2	3	4	5	6	7
2	a) 当你有困难的时候，你可以寻求他／她的帮助吗？	1	2	3	4	5	6	7
	b) 你心中理想的评分是？	1	2	3	4	5	6	7
3	a) 他／她有没有给予具体的帮助？	1	2	3	4	5	6	7
	b) 你心中理想的评分是？	1	2	3	4	5	6	7
4	a) 你们能否抽出时间呆在一起？	1	2	3	4	5	6	7
	b) 你心中理想的评分是？	1	2	3	4	5	6	7

2……

		从不			偶尔			经常
1	c) 你可否信任他／她，坦白地跟他／她分享你的感受	1	2	3	4	5	6	7
	d) 你心目中理想的评分是	1	2	3	4	5	6	7
2	c) 当你有困难的时候，你可以寻求他／她的帮助吗？	1	2	3	4	5	6	7
	d) 你心中理想的评分是？	1	2	3	4	5	6	7
3	c) 他／她有没有给予具体的帮助？	1	2	3	4	5	6	7
	d) 你心中理想的评分是？	1	2	3	4	5	6	7
4	c) 你们能否抽出时间呆在一起？	1	2	3	4	5	6	7
	d) 你心中理想的评分是？	1	2	3	4	5	6	7

3……

		从不			偶尔			经常
1	e) 你可否信任他／她，坦白地跟他／她分享你的感受	1	2	3	4	5	6	7
	f) 你心目中理想的评分是	1	2	3	4	5	6	7
2	e) 当你有困难的时候，你可以寻求他／她的帮助吗？	1	2	3	4	5	6	7
	f) 你心中理想的评分是？	1	2	3	4	5	6	7
3	e) 他／她有没有给予具体的帮助？	1	2	3	4	5	6	7
	f) 你心中理想的评分是？	1	2	3	4	5	6	7
4	e) 你们能否抽出时间呆在一起？	1	2	3	4	5	6	7
	f) 你心中理想的评分是？	1	2	3	4	5	6	7

4……

		从不			偶尔			经常
1	g) 你可否信任他／她，坦白地跟他／她分享你的感受	1	2	3	4	5	6	7
	h) 你心目中理想的评分是	1	2	3	4	5	6	7
2	g) 当你有困难的时候，你可以寻求他／她的帮助吗？	1	2	3	4	5	6	7
	h) 你心中理想的评分是？	1	2	3	4	5	6	7
3	g) 他／她有没有给予具体的帮助？	1	2	3	4	5	6	7
	h) 你心中理想的评分是？	1	2	3	4	5	6	7
4	g) 你们能否抽出时间呆在一起？	1	2	3	4	5	6	7
	h) 你心中理想的评分是？	1	2	3	4	5	6	7

5……

		从不			偶尔			经常
1	i) 你可否信任他／她，坦白地跟他／她分享你的感受	1	2	3	4	5	6	7
	j) 你心目中理想的评分是	1	2	3	4	5	6	7
2	i) 当你有困难的时候，你可以寻求他／她的帮助吗？	1	2	3	4	5	6	7
	j) 你心中理想的评分是？	1	2	3	4	5	6	7
3	i) 他／她有没有给予具体的帮助？	1	2	3	4	5	6	7

	j) 你心中理想的评分是？	1	2	3	4	5	6	7
4	i) 你们能否抽出时间呆在一起？	1	2	3	4	5	6	7
	j) 你心中理想的评分是？	1	2	3	4	5	6	7

6.……

		从不			偶尔			经常
1	k) 你可否信任他／她，坦白地跟他／她分享你的感受	1	2	3	4	5	6	7
	l) 你心目中理想的评分是	1	2	3	4	5	6	7
2	k) 当你有困难的时候，你可以寻求他／她的帮助吗？	1	2	3	4	5	6	7
	l) 你心中理想的评分是？	1	2	3	4	5	6	7
3	k) 他／她有没有给予具体的帮助？	1	2	3	4	5	6	7
	l) 你心中理想的评分是？	1	2	3	4	5	6	7
4	k) 你们能否抽出时间呆在一起？	1	2	3	4	5	6	7
	l) 你心中理想的评分是？	1	2	3	4	5	6	7

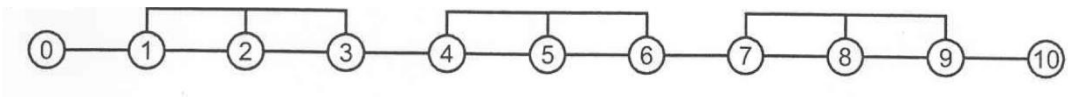
第六部分

请在量表中圈上最贴切的形容。

工作＊／学业：

您的工作／学业正受疾病症状干扰／影响：

完全没有　轻微　中度　显著　严重



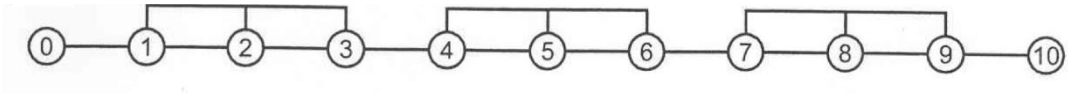
过去一星期，一些于疾病无关的事令我无法上班／学习

* 工作包括有薪水的工作，没有薪水的义工，或训练。

社交生活：

疾病症状已破坏了您的社交生活／休闲活动：

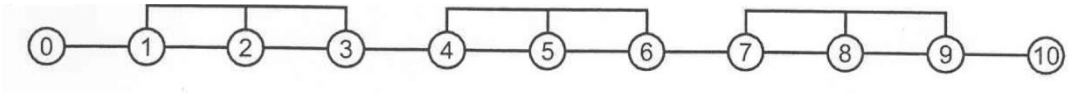
完全没有　轻微　中度　显著　严重



家庭生活／家庭责任：

疾病症状已破坏了您的家庭生活／家庭责任：

完全没有　轻微　中度　显著　严重



第七部分 工作與家庭角色衝突量表:

此份问卷是為了解您目前所到工作与家庭之間冲突的程度; 請您根据自己目前的情況回答,在所 附选项中勾选最能表达您意見的分数:

1= 极為不同意,2= 不同意,3= 既非同意亦非不同意,4=同意,5= 极為同意。

1. 我的工作需求防碍了我的家務與家庭生活。	1	2	3	4	5
2. 長时间的工作使我难以履行家庭义务。	1	2	3	4	5

3. 交付給我的工作量,使我無法完成想要做的家務。	1	2	3	4	5
4. 我因工作上的压力,使我难以履行家庭义务。	1	2	3	4	5
5. 因职务的关系,我必须改变原本家庭活动的计划。	1	2	3	4	5
6. 我的家庭或伴侶的需求妨碍了我的工作相关的活动。	1	2	3	4	5
7.因为将时间花费在家務上,使我必須拖延工作的进度。	1	2	3	4	5
8.因为家庭或伴侶的需要,而使我未能及时完成工作上的事务。	1	2	3	4	5
9. 我的家庭生活妨碍了我的职务,例如无法准时上班或及時完成每日事务、和无法加班工作等.	1	2	3	4	5
10. 我因家庭的压力妨碍了我执行相关职务之能力。	1	2	3	4	5

第八部分 罗森伯格自信心量表

以下是一组有关自我感觉的句子，请按你的情况，圈出合适的数字，1 代表很不同意，4 代表很同意。

1＝很不同意 2＝不同意 3＝同意 4＝很同意				
1 我认为自己是个有价值的人，至少基本上是与别人相等的。	1	2	3	4
2 我觉得我有很多优点。	1	2	3	4
3 总括来说，我觉得我是一个失败者。	1	2	3	4
4 我做事的能力和大部分人一样好。	1	2	3	4
5 我觉得自己没有什么值得骄傲。	1	2	3	4

6 我对于自己是抱着肯定态度。	1	2	3	4
7 总括而言，我对自己感到满意。	1	2	3	4
8 我希望我能够更多的尊重自己。	1	2	3	4
9 有时候我觉得自己很无用。	1	2	3	4
10 有时候我认为自己一无是处。	1	2	3	4

第九部分 工作压力检测表

以下是有关工作情况的句子，请按你的情况，并在空格内填上适当的数字。1 代表非常同意，10 代表非常不同意。

非常同意　　部分同意　　非常不同意 1　2　3　4　5　6　7　8　9　10	
1 工作的时侯，我不能说出自己心里真正的想法	
2 我有很多责任，但是我没有多大的权力	
3 如果给我更多的时间，我能把工作完成得更好	
4 当我表现良好的时侯，我很少得到足够的表扬或赞赏	
5 总括来说，我并不对我的工作满意或自豪	
6 我觉得我在工作中受到挑剔或歧视	
7 我的工作环境不太让人愉快或特别安全	

8 我的工作时常干扰我的家庭生活和社会责任或个人需求	
9 我经常跟上司，同事或客户争吵	
10 在大部分时间我觉得我的工作是我难以控制的	

第十部份 Perceived Inferiority Scale

我们希望研究人们竞争背后的原因。以下的三道题目中，请圈出出你最同意的数字。1 代表最不同意，10 代表完全同意。

1 失败

如果你不跟其他人竞争并取得成功,

a) 你的人生就不会进步

不同意	1	2	3	4	5	6	7	8	9	10	完全同意

b) 你会错过机遇

不同意	1	2	3	4	5	6	7	8	9	10	完全同意

c) 你会落在别人后面

不同意	1	2	3	4	5	6	7	8	9	10	完全同意

2 忽略

如果你不跟其他人竞争并取得成功,

a) 别人会忽略你

不同意	1	2	3	4	5	6	7	8	9	10	完全同意

b) 别人不会对你有多大的兴趣

不同意	1	2	3	4	5	6	7	8	9	10	完全同意

c) 别人会忽略你

不同意	1	2	3	4	5	6	7	8	9	10	完全同意

d) 别人会忘记你

不同意	1	2	3	4	5	6	7	8	9	10	完全同意

3 主动拒绝

如果你不跟其他人竞争并取得成功,

a) 别人会主动地拒绝你

不同意	1	2	3	4	5	6	7	8	9	10	完全同意

b) 别人会推开你

不同意	1	2	3	4	5	6	7	8	9	10	完全同意

c) 别人会批评和羞辱你

不同意	1	2	3	4	5	6	7	8	9	10	完全同意

d) 别人会有意地排斥你

不同意	1	2	3	4	5	6	7	8	9	10	完全同意

问卷完毕，谢谢。